

**Comparison of Acceptance-based and Standard Cognitive-based Coping Strategies  
for Craving Sweets in Overweight and Obese Women**

A Thesis

Submitted to the Faculty

of

Drexel University

by

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in partial fulfillment of the  
requirements for the degree

of

Doctorate in Philosophy

February 2010

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## **Dedications**

This dissertation is dedicated to my loving family for whom I remain forever grateful.

## Acknowledgements

I would like to express my sincere gratitude to my primary advisor and chair, Dr. Evan Forman, for his invaluable guidance, support, and expertise. Special thanks to my secondary advisor and committee member, Dr. James Herbert, for all of his help and advice. I would also like to acknowledge my committee members, Dr. Michael Lowe, Dr. Meghan Butryn, and Dr. Alix Timko, for their many contributions to this project. To my fellow lab members, I want to express my gratitude for their help in carrying out this project.

Very special thanks to my parents for their patience, support, love, and unwavering faith in me. To my sister Kelly and brother Jody, I want to express my gratitude for their encouragement and love. Thanks to my grandparents who have loved and believed in me for as long as I can remember. I would also like to acknowledge my friends for their support and understanding. Thanks to Good Karma Cafe for giving me a friendly and comforting space to work, and to my friend and fellow graduate student, Christina Riggs Romaine, for her companionship and encouragement. Finally, heartfelt thanks to my husband and best friend Micah for supporting me every day throughout this process, for his unconditional love and faith in me, and for giving me tremendous happiness. For this, I am forever grateful.

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### **Abstract**

#### **Comparison of Acceptance-based and Standard Cognitive-based Coping Strategies for Craving Sweets in Overweight and Obese Women**

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Though obesity is reaching epidemic proportions, behavioral weight management programs have proven to be only moderately effective in the short-term, and minimally effective in the long-term. The limited success of behavioral interventions for weight loss is likely due to the difficulty that participants experience in trying to adhere to the behavioral regimen necessary for weight loss. Most importantly, weight loss and maintenance require strict adherence to a low-calorie diet, which requires the ability to resist food cravings. The present study utilized an analogue paradigm to investigate the effectiveness of coping strategies for sweet cravings. The primary objective of this study was to determine what type of coping strategy would be most effective at helping overweight and obese women manage sweet cravings and whether the effectiveness varied as a function of susceptibility to the presence of food and tendency to engage in emotional eating. Seventy-three overweight and obese women were recruited from the community and were randomized to one of three groups: a standard cognitive-based coping strategy group, an acceptance-based coping strategy group, or a no intervention group for managing cravings for sweets. Because converging evidence suggested that the no intervention group was non-compliant with study requirements, comparisons between the two active intervention groups were emphasized. The overall pattern suggested that acceptance-based coping strategies may offer an advantage in helping overweight and obese women manage and resist acting on sweet cravings. In particular, this study

suggests that acceptance-based strategies may be especially beneficial for those who demonstrate the highest levels of susceptibility to the presence of food and tendency to engage in emotional eating. While the findings must be considered cautiously given several limitations of the study design (e.g., problems with the no intervention group and small sample size), the results raise the possibility that acceptance-based approaches may have an important place in obesity management programs.

## **1. INTRODUCTION**

### **1.1. Obesity**

Obesity is a significant health concern in our society. In fact, the World Health Organization (WHO) recently declared obesity to be a major concern for global health (World Health Organization, 1998). Obesity results from a positive imbalance between food energy ingested and energy expended. The classification of overweight and obesity is most commonly made on the basis of body mass index (BMI), an estimation of total body fat equal to body weight in kilograms divided by height in meters squared. The World Health Organization classifies overweight by a BMI 25.0-29.9, and obesity as a BMI greater than 30. Extreme obesity has been defined as a BMI of 40 or greater (Flegal, Carroll, Ogden, & Johnson, 2002).

#### **1.1.1. Prevalence**

Recent estimates from the WHO indicate that there are more than one billion overweight individuals worldwide, and at least 300 million of them are obese (World Health Organization, 2006). In fact, obesity is currently more prevalent than malnutrition (Mokdad et al., 2001). In the United States, the number of obese Americans has doubled over the past two decades (Flegal et al., 2002; Hedley et al., 2004). Currently, 64% of the adult population in the United States is either overweight or obese (Hedley et al., 2004).

#### **1.1.2. Health Effects**

Research has demonstrated the significant harmful effects of being obese. Obesity is associated with an increased risk of developing coronary heart disease, hypertension, hyperglycemia, hypercholesterolemia, ischemic stroke, type 2 diabetes mellitus, sleep

apnea, certain carcinomas, and osteoarthritis, as well as many other health problems (Manson, Skerrett, & Willet, 2001). It is also responsible for an estimated 90% of cases of diabetes and 70% of cases of hypertension (Low, Bouldin, Sumrall, Loustalot, & Land, 2006). Furthermore, obesity has been shown to be an even stronger predictor of mortality and morbidity than either poverty or smoking (Peeters et al., 2003). Approximately 280,000 adults in the United States die annually of obesity-related causes (Manson et al., 2001).

### **1.1.3. Economic Burden**

The growing epidemic of overweight and obesity has resulted in a tremendous burden to the economies of affluent societies. In these countries, obesity accounts for up to 6% of health care expenses (Narbro et al., 2002). The pharmaceutical expenses related to treating obesity-related diseases alone account for 30% of that cost (Narbro et al., 2002). In the United States, approximately 5% to 7% of total annual medical expenditures, or \$75 billion per year, is attributable to obesity (Finkelstein, Ruhm, & Kosa, 2005). Obesity consumes approximately 12% of the nation's health care budget, and, in 1995, the direct health care costs attributed to obesity were estimated to be \$51.6 billion (Wolf & Colditz, 1998).

### **1.1.4. Quality of Life**

Obesity has a significant negative impact on quality of life, and this is most often reported in terms of health-related consequences. Physical problems, such as shortness of breath and chronic lower back pain, are common among obese individuals (e.g., Lean, Han, & Seidell, 1999). Such problems make it difficult for obese individuals to engage in

even minor physical tasks, such as walking several blocks, bending, carrying groceries, and kneeling (e.g., Coakley et al., 1998; Han, Tijhuis, Lean, & Seidell, 1998). Physical impairment associated with excess weight has also been shown to have a substantial negative impact on work and social functioning (Wadden, Womble, Stunkard, & Anderson, 2002). Moreover, the ill-effects of stigmatization related to being overweight have been directly linked to psychological distress, negative body image, and negative self-esteem (Myers & Rosen, 1999).

## **1.2. Weight Loss Methods**

Given the considerable negative consequences of being overweight, it is perhaps not surprising that many overweight and obese individuals are currently attempting to lose weight. In fact, approximately one in three adults (regardless of BMI) in the United States reports trying to lower his or her weight (Jeffery, Adlis, & Forster, 1991; Kruger et al., 2004; Paeratakul, York-Crowe, Williamson, Ryan, & Bray, 2002; Serdula et al., 1999). Clinical guidelines recommend that individuals who want to lose weight restrict their caloric intake and increase physical activity simultaneously (National Heart, Lung, and Blood Institute, 1998). However, data from the 1998 National Health Survey reveal that only one-third of those who reported trying to lose weight followed the recommended strategy (Kruger et al., 2004). Failure to engage in effective weight loss behaviors may help explain why almost 95% of dieters will fail on their initial attempt (Garner & Wooley, 1991). Even those dieters who are able to lose weight initially are likely to regain the lost weight within five years and then continue to gain more weight (Crawford, Jeffery, & French, 2000; National Task Force on the Prevention and Treatment of Obesity, National Institutes of Health [NIH], 1993).



Given the difficulty that many overweight and obese individuals have in losing weight on their own, it is perhaps unsurprising that a large number of individuals seek assistance. Currently, there are several options available to individuals who want help in losing weight: pharmacologic therapy, surgical methods, self-help and commercial programs, and behavioral weight loss interventions. These methods have been shown to vary substantially in terms of their safety and effectiveness.

Research indicates that weight-loss medications produce greater weight losses than placebo with the average increased weight loss being approximately 5 kg (e.g., Arterburn, Crane, & Veenstra, 2004). Weight loss surgeries have been shown to be more effective for weight loss than medications, resulting in an average weight loss of 25-75 kg after 2-4 years (Douketis, Macie, Thabane, & Williamson, 2005). However, despite being potentially very effective, the use of such treatments is limited as they are (1) not available to many overweight individuals because of the strict BMI requirement, (2) have been shown to have mixed long-term success, and (3) are associated with a number of serious health risks.

Self-help (e.g., Overeaters Anonymous) and commercial (e.g., Weight Watchers) programs are particularly attractive to individuals who want help losing weight as they provide structure and support. However, there is limited data on both short- and long-term efficacy and safety of most self-help and commercial weight loss programs.

### **1.2.1. Behavioral Weight Loss Programs**

An alternative to these approaches are behavioral weight loss programs which have substantial empirical evidence supporting their effectiveness in helping overweight and obese individuals lose weight. In addition, they have not been shown to be

associated with significant health risks. Behavioral weight loss programs utilize both behavioral and cognitive interventions to help participants identify and change maladaptive eating behaviors. The core behavioral interventions, which include those focused on stimulus control (e.g., eating in designated locations), self-monitoring (e.g., food logs) and contingency management (e.g., rewarding oneself for meeting goals), are designed to alter the learned patterns that are maintaining the problematic eating behaviors (Abramson, 1977; Brownell & Jeffery, 1987). Similarly, cognitive techniques, including cognitive restructuring and relapse prevention, aim to help participants identify and modify problematic thought processes that may be implicated in their maladaptive eating and activity behaviors (Brownell & Jeffery, 1987; Keefe & Blumenthal, 1980; Stunkard & Berthold, 1985).

In addition to the behavioral and cognitive strategies used to change maladaptive eating and activity habits, behavioral “packages” also include dietary and physical activity guidelines. Some researchers refer to these “packages” as “lifestyle modification” or “behavioral weight control” programs (Wadden & Butryn, 2003). Currently, a number of behavioral “packages” have been developed and summarized in manuals, such as the LEARN (Lifestyle, Exercise, Attitudes, Relationships and Nutrition) Program for Weight Management (Brownell, 2000). The LEARN program’s effectiveness has been demonstrated in both clinical and research settings (e.g., Ashley et al., 2001; Womble et al., 2004). The LEARN program incorporates behavioral, cognitive, educational, nutritional, and motivational components, and focuses on modifying eating, thinking, and activity levels. Participants limit their daily caloric

intake, increase physical activity, and practice weight control behaviors, such as self-monitoring, stimulus control, and cognitive restructuring.

The effectiveness of behavioral programs, such as LEARN, has been evaluated in terms of both short-term weight loss and long-term weight maintenance. Weight loss programs that combine behavioral and cognitive techniques typically result in weight losses of between 5% and 10% of initial body weight for treatment completers (Brownell & Jeffery, 1987; Mann et al., 2007; Wilson, 1994). Weight losses between 5 and 10% of initial body weight, when maintained, have been shown to result in the following health improvements: reductions in blood pressure, hyperlipidemia, and blood glucose (Pi-Sunyer, 1996). Because of the associated health benefits, the Institute of Medicine (Thomas, 1995) suggests that weight loss programs should be considered “successful” if they result in weight losses that are greater than or equal to 5% of body weight and that are maintained for at least one year.

Despite the moderate shorter-term success of behavioral weight loss programs, long-term effectiveness remains extremely poor, a problem that has received a great deal of attention in the obesity literature. In fact, a number of researchers believe that maintenance of weight loss “represents the single greatest challenge in the long-term treatment of obesity” (Perri, 1998, p. 526). Of those individuals who do lose weight, only a small number are successful at maintaining the weight loss. On average, participants in behavioral weight loss programs regain 30% to 35% of their lost weight within a year following the end of treatment (Wadden & Butryn, 2003). At least half of the participants will regain all of their lost weight within five years (Wadden & Butryn, 2003). A recent review of long-term outcomes from calorie restricting diets revealed that

between one- and two-thirds of participants actually regained more weight than they initially lost on the diet (Mann et al., 2007). Moreover, the authors suggested that their findings may actually underestimate participants' failure to maintain weight losses given methodological problems of the reviewed studies that were in favor of demonstrating more successful weight loss maintenance (Mann et al., 2007).

### **1.3. Problem of Dietary Adherence**

Thus, despite moderate initial weight loss, behavioral weight loss programs result in unsatisfactory long-term weight maintenance. Two possible explanations for this lack of success are (1) the behavioral changes recommended (i.e., decreased calorie intake and increased energy expenditure) are not sufficient to produce weight loss even when implemented successfully, and/or (2) individuals are unable to maintain the behavioral changes to the degree necessary to lose substantial amounts of weight and not regain the lost weight. The fact that individuals lose weight initially, and at a steady rate, suggests that the former explanation is not correct. In fact, data from a group of individuals who have successfully lost weight (i.e., National Weight Control Registry) indicate that those who are successful at weight maintenance report continued adherence to dietary recommendations as compared to those who have gained weight (McGuire, Wing, Klem, Lang, & Hill, 1999). Thus, it is likely that the primary reason for limited weight loss and probable weight gain is the difficulty individuals have in maintaining the necessary weight loss behaviors.

Research indicates that a variety of factors may be responsible for the difficulty individuals experience in trying to adhere to behaviors that regulate energy balance and produce weight loss. One important (but often overlooked) factor may be the occurrence

of food cravings. In fact, food cravings have been linked to unwanted eating behaviors (e.g., Bjorvell, Ronnberg, & Rossner, 1985) as well as early dropout from weight-loss programs (Sitton, 1991).

#### **1.4. Food Cravings**

Food cravings are defined as strong or intense desires for a particular type of food (Hill, Weaver, & Blundell, 1991; Weingarten & Elston, 1991; White et al., 2002). They are most commonly reported for highly palatable foods that are often identified as dessert or snack-type foods (e.g., Hill & Heaton-Brown, 1994; Weingarten & Elston, 1991). Chocolate has been repeatedly identified as the most commonly craved food, followed by other sweet foods, such as cookies, ice cream, and cakes (e.g., Gendall, Joyce, & Sullivan, 1997; Hill & Heaton-Brown, 1994; Hill et al., 1991). Food cravings are distinguished from other urges to eat, such as those occurring in a state of hunger, by their combined intensity and specificity. Intensity refers to the tendency for individuals to go out of their way to obtain the desired food (Pelchat, 2002). Studies have shown that individuals who experience cravings rate their cravings as being moderately to extremely strong (Gendall et al., 1997; Hill & Heaton-Brown, 1994), and a large majority of food cravers find it difficult to resist their cravings (Gendall et al., 1997; Pelchat, 1997; Weingarten & Elston, 1991). Specificity suggests that only certain foods will satisfy this intense desire (Pelchat, 2002). Thus, what distinguishes food cravings from hunger and other urges to eat is both their intensity and specificity.

### **1.4.1. Prevalence**

Available estimates of those experiencing food cravings vary widely depending on the sample selected and the time frame over which they are assessed (e.g., over the course of one week vs. over a lifetime). A study assessing food cravings in a sample of American college undergraduates found that 97% of women and 68% of men reported experiencing food cravings at some point in their lifetimes (Weingarten & Elston, 1991). Similarly, a study examining food cravings among American and Spanish students found that almost all participants (American: 95% male, 100% female; Spanish: 100% male, 99% female) reported having ever craved a food (Osman & Sobal, 2006). Another study of New Zealand women between the ages of 18 and 45 (which was not limited to students) found a smaller percentage (i.e., 58%) who reported having ever experienced food cravings (Gendall et al., 1997). This study also found that 50% reported food cravings within the past month and only 18% reporting weekly cravings suggesting that shorter time periods may be associated with a decreased frequency of food cravings. A French sample revealed that only 28% of females and 13% of males reported experiencing food cravings more than once a week during the preceding six months (Lafay et al., 2001). In addition to differences in the time periods assessed (e.g., lifetime vs. past six months), the differences between reported cravings among the various samples may be attributed to cultural influences on the experience of food cravings. For example, the food environment in America is such that highly palatable and energy-dense foods are readily available and cheaply attained. This may help to explain the higher rates of food cravings among Americans (as compared to French individuals, for example).

In addition to the frequency of cravings, culture appears to also influence the types of foods that are craved (e.g., Osman & Sobal, 2006; Parker, Kamel, & Zellner, 2003; Zellner, Garriga-Trillo, Rohm, Centeno, & Parker, 1999). For example, Zellner (1999) found that American and Spanish women primarily reported cravings for sweet foods, and in particular, chocolate. Similarly, Osman & Sobal (2006) compared rates of chocolate cravings among American and Spanish undergraduates while statistically controlling for participants' cultural involvement (e.g., years spent in the country, media use). They found that the majority of American and Spanish women reported chocolate cravings (91% and 90%, respectively). In contrast, a study examining rates of cravings in Egypt, where the availability of chocolate is limited, found that chocolate cravings only made up a small percentage of primary cravings. Moreover, Egyptian women reported more cravings for savory foods than sweet foods (Parker et al., 2003). The higher frequency of sweet cravings (and chocolate cravings in particular) among American and Spanish females may be at least partially explained by the food environments in which such foods are readily available.

While food cravings appear to be commonly reported among overweight and obese individuals (Bjorvell et al., 1985; Harvey, Wing, & Mullen, 1993), there is no clear evidence to suggest that overweight and obese individuals experience food cravings to a greater extent than normal weight individuals. Several studies have found no difference in body mass index among individuals identified as cravers and those not identified as such. For example, a cross-sectional study of healthy women found that the number and frequency of reported cravings did not correlate with degree of overweight (Rodin, Mancuso, Granger, & Nelbach, 1991). Similarly, a study of community adults found no

difference in self-reported body mass index between cravers and non-cravers (Lafay et al., 2001). Taken together, these studies suggest that food cravings are a common occurrence, irrespective of body weight.

Although the occurrence of food cravings does not appear to differ significantly with BMI, it remains possible that individuals who are overweight may find their cravings to be more problematic than their normal weight counterparts. For example, overweight individuals may tend to give in to their food cravings more often which may serve to maintain their overweight status. For those overweight individuals who are trying to lose weight by dieting, they may experience more distress associated with their cravings to the extent that they are for foods that they are trying to resist eating. Finally, food cravings may be particularly problematic for individuals who have recently lost weight as they will likely need to continue resisting cravings for unhealthy foods in order to maintain their weight loss but may have a more difficult time doing so as it will be less likely that they will continue to be positively reinforced by increased weight loss.

#### **1.4.2. Determinants of Food Cravings**

Research indicates that there are several physiological and psychological factors that may be responsible for the occurrence of food cravings. Currently, there is no general consensus on the exact mechanism responsible for regulating food cravings. Rather, it appears that food cravings are a multidimensional phenomenon that likely results from a complex interplay of factors (Cepeda-Benito, Gleaves, Williams, & Erath, 2000; Pelchat, 1997).



#### **1.4.2.1. Nutritional Deficit**

One theory underlying the occurrence of food cravings is that they occur in response to a nutritional deficiency (Wardle, 1987). According to this theory, the individual would crave food containing the nutrient that his or her body needs. For example, the serotonin theory suggests that depletion of brain serotonin, a neurotransmitter that is involved in the modulation of mood, emotion, sleep, and appetite, leads to cravings for carbohydrates (Wurtman, 1986; Wurtman & Wurtman, 1986). When carbohydrate-rich foods are consumed in the absence of protein, the availability of the serotonin precursor tryptophan increases, which in turn increases the level of brain serotonin. There has been some support for the serotonin theory. For example, consumption of carbohydrates by depressed individuals leads to increases in serotonin which may have a reinforcing effect that results in cravings for carbohydrates (Wurtman, 1988; Wurtman & Wurtman, 1995) .

There are some problems with the serotonin theory that have led some researchers to question its validity. According to this theory, serotonin levels should be influenced by ingestion of both sweet and non-sweet carbohydrates, and so the theory does not explain the higher frequency of cravings for foods that are sweet-tasting (Pelchat, 2002). Additionally, the serotonin theory ignores the fact that most of the sweets that are craved and consumed are also high in fat. Thus, it may be that individuals are craving sweets for sensory properties unrelated to sweetness or the effects of sugar in the brain. For example, they may crave these foods because of their sensory properties, such as their texture, taste, and palatability, related to their high fat content. In fact, this is supported by research indicating that individuals often crave foods that are high in fat and not sugar,

such as potato chips and pizza (e.g., Gendall et al., 1997; Hill & Heaton-Brown, 1994; Rodin et al., 1991).

#### **1.4.2.2. Opioidergic Theory**

Another neurotransmitter system that has been implicated in the occurrence of food cravings is the endogenous opiate system, which is a part of the food reward system. According to this theory, changes in endogenous opioid peptide (EOP) activity results in food cravings which in turn leads to consumption of the craved foods (Mercer & Holder, 1997). The relationship between EOPs and food intake has been demonstrated by pharmacological studies that have found that administration of EOPs and opioid agonists increases food intake whereas opioid antagonists decrease food intake (Mercer & Holder, 1997). While these studies demonstrate a relationship between EOPs and food intake, the mechanisms through which EOPs affect cravings and intake has not been fully discerned. One widely held theory is that EOPs may be involved in the palatability or rewarding aspects of eating (for reviews, see Olson, Olson, & Kastin, 1989; Reid, 1985). Accordingly, researchers have proposed that the increase in palatability that results from opioid activity may induce food cravings, which in turn leads to increased consumption (Mercer & Holder, 1997). The opioidergic theory of food cravings is supported by correlation research indicating that several clinical conditions, including pregnancy, menstruation, bulimia nervosa, stress, and depression, are associated with altered EOP levels as well as intensified food cravings and increased food consumption (Mercer & Holder, 1997).

### **1.4.2.3. Obesogenic Environment**

The mere presence of desirable foods can be enough to elicit strong urges for certain foods, which is especially problematic given the ubiquity of highly palatable foods in developed societies (Cornell, Rodin, & Weingarten, 1989). In fact, the current food environment has been labeled *obesogenic* in part because of the widespread availability and easy accessibility of highly palatable and energy-dense foods. This obesogenic environment is considered a main contributor to weight gain and to the current obesity epidemic (Blundell & Finlayson, 2004; Lowe & Levine, 2005). Food cravings occurring in response to the presence of food are problematic to the extent that they consistently lead to consumption in the absence of homeostatic hunger, i.e., the need for food resulting from a physiological state of energy deficit (Lowe & Levine, 2005). Over time, consistent consumption in the absence of homeostatic hunger will result in a positive energy balance, and as a result, weight gain. Thus, the ubiquitous presence of food in modern society may be partially responsible for the frequent occurrence of food cravings.

### **1.4.2.4. Perceived Deprivation**

To the extent that individuals attempt to restrict their consumption, they may experience a state of perceived deprivation. Perceived deprivation refers to the psychological state in which an individual eats less than he or she wants (Timmerman & Gregg, 2003). This “*wanting*” or desire to eat occurs in the absence of the “*need*” to eat that results from an energy deficit (Lowe & Levine, 2005). In contrast to need-based appetitive motives that occur in response to the individual’s current energy status, the want-based appetitive motives typically arise in response to external factors such as the

presence of a palatable food or a certain time of day (Lowe & Levine, 2005). Feelings of perceived deprivation are often associated with preoccupation with food and increased food cravings and can lead to consumption of desired foods in the absence of an energy deficit (Lowe & Levine, 2005). In particular, feelings of perceived deprivation may influence the type of food cravings that an individual experiences. Namely, individuals who are restricting sweet foods may experience increased feelings of perceived deprivation and cravings for sweet foods specifically.

#### **1.4.2.5. Emotions**

Research has indicated that strong emotional states, particularly negative emotional states, are related to increases in food cravings (Hill et al., 1991; Weingarten & Elston, 1991). In particular, food cravings are thought to be associated with sadness, boredom, and stress (Hill et al., 1991; Lafay et al., 2001; Weingarten & Elston, 1991). For example, a prospective study examining food cravings over a five-day period in a sample of healthy women identified as either cravers or non-cravers found that the cravers reported higher rates of boredom and anxiety during the day and reported that negative mood states almost always preceded the occurrence of their food cravings (Hill et al., 1991). The majority of the cravers in this study reported that most of their cravings were for sweets foods, and for chocolate in particular. Several other studies have also demonstrated that women tend to experience sweet cravings in response to negative emotional states (e.g., Rogers, Anderson, Finch, Jas, & Gatenby, 1994; Schuman, Gitlin, & Fairbanks, 1987). Moreover, increased sweet cravings are associated with several mood disorders including depressive disorders (Fernstrom, Krowinski, & Kupfer, 1987; Kazes et al., 1994), seasonal affective disorder (e.g., Krauchi, Wirz-Justice, & Graw,

1990), and premenstrual syndrome (e.g., Bancroft, Cook, & Williamson, 1988). Thus, it appears that for certain individuals, negative emotions may lead to increases in food cravings.

#### **1.4.2.6. Dietary Restraint**

Dietary restraint has also been implicated in the occurrence of food cravings. Restraint has been defined as a cognitively-mediated attempt to resist food so as to control body weight (Herman & Mack, 1975), and has been traditionally assessed using the Restraint Scale (RS; Herman & Polivy, 1980). Although restraint (as defined by the RS) was initially thought to be synonymous with “dieting” (Herman & Polivy, 1980), research has demonstrated that “dietary restraint” (as defined by the RS) and “dieting” (as defined as a current effort to reduce caloric intake for the purpose of weight loss) are in fact distinct constructs that are associated with different eating patterns (Lowe, 1993).

Contrary to what might be expected, a review of studies found that most individuals who were classified as restrained eaters were not currently dieting (Lowe, 1993). The absence of a correlation between restraint status and current dieting has led some researchers to conclude that the construct of restraint more accurately reflects a pattern of *unsuccessful* dieting in which efforts to diet for weight loss are repeatedly undermined by episodes of overeating (Heatherton, Herman, Polivy, King, & McGree, 1988). Examination of the individual items of the Restraint Scale provides further support for the definition of restraint as a measure of unsuccessful dieting. For example, it contains items that directly assess overeating (e.g., “Do you eat sensibly in front of others and splurge alone?” and “Do you have feelings of guilt after overeating?”) as well as items that measure weight fluctuation (e.g., “In a typical week, how much does your

weight fluctuate?” and “What is your maximum weight gain within a week?”). In fact, validity studies evaluating the subscales of the RS have found that it measures both the intent to diet as well as susceptibility to overeating (e.g., Heatherton et al., 1988; Laessle, Tuschl, Kotthaus, & Pirke, 1989b; Williamson et al., 2007). This pattern of dieting and overeating characterizes a facet of dieting behavior contained in Lowe’s (1993) three-factor model of dieting, which also includes current dieting and weight suppression (i.e., significant dieting-induced weight loss that has been sustained for a long period of time). Thus, the RS continues to be used in eating research as a measure of a specific pattern of eating behavior (i.e., repeated cycles of dieting and overeating) that may in fact be different from that seen among individuals who are actually dieting.

The relationship between restraint (as defined using the RS) and food cravings is unclear. Early studies suggested that restraint was associated with increased food cravings, perhaps due to feelings of deprivation and energy deficits (Weingarten & Elston, 1990). However, subsequent studies demonstrated that restrained and unrestrained eaters actually experience food cravings to the same degree, but that only restrained eaters tend to increase their consumption in response to their cravings (Hill et al., 1991; Rodin et al., 1991; Weingarten & Elston, 1991). This finding is consistent with studies demonstrating that restrained eaters increase consumption following a high-calorie preload as opposed to no preload and following exposure to emotionally-distressing stimuli as opposed to neutral stimuli (e.g., Heatherton, Polivy, & Herman, 1990; Ruderman, 1986). This pattern of increasing consumption in response to a high-calorie pre-load, emotionally-distressing stimuli, or to some other external stimuli (such as the presence of palatable food) has been referred to as counter-regulatory or

disinhibited eating (Herman & Polivy, 1988). According to these studies, restrained eaters have a greater tendency to engage in counter-regulatory eating as compared to unrestrained eaters

However, the relationship between restraint and counter-regulatory eating is more complicated than initially thought. Lowe and colleagues (1991) found that the relationship between restraint status and counter-regulatory eating actually depends on whether or not the individual is dieting (as assessed by asking participants whether or not they were currently on a diet to lose weight). They found that only restrained eaters who were not currently dieting demonstrated the pattern of counter-regulatory eating following consumption of a high-calorie preload than after consuming no preload (Lowe et al., 1991). In contrast, restrained eaters who were currently dieting tended to eat less following consumption of a high-calorie preload as compared to consuming no preload (Lowe et al., 1991). This finding was replicated in a study examining differences in ice cream consumption among restrained and unrestrained eaters who were randomized to either restrict their food intake or to eat normally for a period of two days (Lowe, 1994). Results indicated that restrained eaters who had not restricted their intake consumed more ice cream than restrained eaters who had restricted their intake. Thus, the moderating effect of current dieting on the relationship between restraint status and counter-regulatory eating suggests that whether or not restrained eaters give in to their food cravings may be influenced by whether or not they are currently dieting.

In an attempt to provide a more accurate assessment of restrained eating, several other self-report measures of the cognitive and behavioral strategies associated with dieting have been developed. These include the Cognitive Restraint Scale of the Eating

Inventory (EI, formerly the Three-Factor Eating Questionnaire, TFEQ; Stunkard & Messick, 1985) and the Restrained Eating Scale from the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien, Frijters, Bergers, & Defares, 1986). As would be expected if these measures accurately assessed current dieting behavior, they have been shown to predict reduced caloric intake in a natural environment in restrained eaters relative to unrestrained eaters (Laessle, Tuschl, Kotthaus, & Pirke, 1989a; Laessle et al., 1989b; Wardle & Beales, 1987). A recent study testing the validity of these measures found that while the restraint scales of both the EI and DEBQ may be good indicators of the intent to diet in cross-sectional research, only the EI was found to be a valid indicator of actual calorie restriction (Williamson et al., 2007). In contrast, Stice and colleagues (2007) demonstrated that the restraint subscale of the EI was in fact not correlated with energy intake estimated with doubly labeled water over a 2-week period nor was it correlated with energy intake over a 3-month period.

#### **1.4.2.7. Current Dieting**

Given that the measures of dietary restraint do not accurately assess current dieting status, a more informative way to examine the relationship between dieting and food cravings is to evaluate changes in food cravings and associated eating behaviors during weight loss interventions and food restriction studies. Overall, mixed results have been found for the effect of weight loss diet interventions on food cravings (Gilhooly et al., 2007; Harvey et al., 1993; Lappalainen, Sjoden, Hursti, & Vesa, 1990; Martin, O'Neil, & Pawlow, 2006; Rosen, 1981). Several of these studies found that participants reported fewer cravings during and after the dietary intervention than they did before it began (Harvey et al., 1993; Lappalainen et al., 1990; Martin et al., 2006). For example,



participants in a six-month weight loss program on a low (i.e., restricted to 1000-1200 kcal/day and all foods were allowed in moderation) or very low calorie diet (i.e., restricted to 400kcal/day and only lean meat, fish, and fowl were allowed) reported significant decreases in food cravings (Harvey et al., 1993). However, this finding was not replicated in a more recent study. Gilhooly and colleagues (2007) examined changes in food cravings during a six-month energy restriction diet and they found that the frequency and intensity of cravings did not decrease with dieting and weight loss. Moreover, they found that participants who were more successful in losing weight reported increased cravings for energy dense foods compared to participants who lost less weight. This suggests that cravings may be likely to return once a weight loss program ends. Despite reporting increased cravings for high fat and high sugar foods, the participants who lost more weight demonstrated fewer incidents of consuming the craved foods. This finding suggests that while cravings may not be preventable, eating in response to them may be. Thus, it may be more beneficial for weight loss interventions to target participants' responses to their cravings rather than aim to change or get rid of their cravings.

Another possibility is that participants may experience an increase in cravings and consumption of craved foods once they have stopped dieting. Unfortunately, the abovementioned studies did not assess long-term changes in cravings or consumption of craved foods once the interventions ended and the external pressures to restrict these foods was lifted. Several studies have suggested that overweight and obese individuals are susceptible to subsequent overeating (Lowe, Foster, Kerzhnerman, Swain, & Wadden, 2001; Wardle & Beales, 1988). Additionally, analog studies in which

participants are instructed to restrict consumption of specific types of foods over a short time period have similarly demonstrated a “rebound effect” wherein participants experience increased cravings for and increased consumption of the previously restricted foods. Short-term restriction studies in which participants consume meals low in a certain macronutrient (e.g., carbohydrate) have found that participants experience increased cravings for and consumption of foods that contained more of the restricted macronutrient (Gendall, Joyce, & Abbott, 1999; Latner & Schwartz, 1999). Finally, a study designed for the explicit purpose of testing the “rebound effect” found that participants who were instructed not to consume a target food (defined as a food that they liked, consumed approximately three times per week, and had readily available to them) for a period of five days experienced increased thoughts about and desire for the food in the week following the restriction period during which they were given permission to consume their target food (Mann & Ward, 2001). However, contrary to predictions, participants did not subsequently increase their consumption of the food. The authors concluded that while food restriction may lead to “rebound thinking,” it does not necessarily lead to overindulgence of the restricted food. An important limitation of this study is that participants were able to consume several other foods during the restriction period that may have satisfied their cravings for the restricted food. Taken together, these studies suggest that the “rebound effect” in and of itself may be a problem for individuals who have a tendency to cycle between periods of dieting and not dieting.

#### **1.4.3. Food Cravings and Problematic Eating Behaviors**

Regardless of what triggers or leads to the occurrence of food cravings, they are likely only to be problematic if they lead to significant distress or to unwanted eating

behaviors. This is particularly relevant for individuals who are trying to adhere to a diet. Studies have demonstrated that food cravings can lead to specific, maladaptive eating behaviors that may help explain how they negatively affect adherence to a caloric or food restriction plan (e.g., Bjorvell et al., 1985). These potentially maladaptive eating behaviors include increased intake of high calorie foods, increased snacking, and increased binge eating.

#### **1.4.3.1. Increased Consumption of High Calorie Foods**

The most commonly craved food is chocolate followed by other sweet foods, such as cookies, ice cream, and cakes (e.g., Gendall et al., 1997; Hill & Heaton-Brown, 1994; Hill et al., 1991). Studies also indicate that many individuals report cravings for savory foods, such as pizza and potato chips. Cravings for such high calorie foods are problematic to the extent that they lead to overconsumption. Sweet and savory foods are very palatable and pleasurable to consume and so can serve as potent reinforcers. Their reinforcing-effect makes them more likely to be over-eaten than many other foods. Given that these foods are typically high in fat, and thus high in calories, overconsumption can lead to weight gain or failure to lose weight. According to one study, fully one-half of overweight women experience unwanted cravings for carbohydrates that precipitate unwanted eating and contribute to their inability to lose weight (Bjorvell et al., 1985).

Overconsumption of sweet and savory foods is also problematic to the extent that it is associated with health problems. In addition to the problems associated with overweight and obesity, overconsumption of certain types of fats can increase blood cholesterol levels and thus increase the risk of coronary artery disease (Hu et al., 1997).

Excess intake of sweets can lead to dental caries (i.e., a disease affecting the structure of teeth and which leads to tooth decay) as well as bone loss and fractures (Johnson & Frary, 2001).

#### **1.4.3.2. Increased Snacking and Binge Eating**

For some individuals, cravings can lead to increased snacking (i.e., eating outside of meals) and binge eating behaviors (i.e., consuming large quantities of food in a very short period of time). Several studies have indicated that excessive energy intake between meals is a major source of overeating (Bjorvell et al., 1985; Wurtman et al., 1981). For example, Wurtman (1986) reported that a large number of obese individuals indicate that their cravings for sweet foods, in particular, precipitate their snacking behavior. Similarly, in a sample of obese women, sweet cravings were associated with increased snacking in the afternoon and evening (Schlundt, Virts, Sbrocco, Pope-Cordle, & Hill, 1993). Studies have also identified food cravings as a precursor to binge eating (e.g., Gendall, Joyce, Sullivan, & Bulik, 1998). The relationship between cravings and both snacking and binge eating behaviors is problematic to the extent that these behaviors are associated with increased risk for becoming overweight or obese. In fact, positive relationships have been identified for the relationship between snacking and high BMI (Forslund, Torgerson, Sjostrom, & Lindroos, 2005) as well as binge eating and high BMI (Delahanty, Meigs, Hayden, Williamson, & Nathan, 2002).

In summary, food cravings may contribute to obesity to the extent that they increase urges to increase caloric intake above that which is necessary to maintain energy balance. This may be especially problematic for those individuals who are already overweight or obese and who have a difficult time resisting their food cravings. Thus, a

critical challenge of obesity management efforts is the ability to help individuals manage food cravings such that they do not lead to unhealthy food consumption.

### **1.5. Limitations of Existing Strategies for Food Cravings**

Despite the importance of food cravings, existing weight loss interventions, such as the LEARN Program for Weight Maintenance (Brownell, 2000) and the Diabetes Prevention Program (The Diabetes Prevention Program Research Group, 1999) do not place a great deal of emphasis on teaching participants ways to cope with problematic cravings. The behavioral and cognitive strategies that they recommend are often not explicitly linked to food cravings but rather are taught as strategies to improve dietary adherence more generally. Furthermore, these strategies have not been evaluated in isolation and so it remains unknown whether or not they help participants manage their food cravings. More recently, there have been some studies evaluating the effectiveness of specific strategies for managing food cravings, such as reinforced cue exposure (e.g., Hetherington, 2001) and imagery-based distraction (e.g., Harvey, Kemps, & Tiggemann, 2005). However, the research on these strategies is limited and their effectiveness remains uncertain.

#### **1.5.1. Cognitive and Behavioral Interventions**

Behavioral strategies are a key component of both the LEARN program and the DPP. The majority of these strategies (e.g., self-monitoring, planning ahead) are not directly related to food cravings. Of the behavioral strategies, stimulus control is perhaps the most helpful for dealing with problematic food cravings. Stimulus control refers to the strategy of engaging in behaviors that limit exposure to foods, particularly palatable

foods, as well as to places and situations associated with eating (e.g., Ferster, Nurnberger, & Levitt, 1996; Stuart, 1967). Accordingly, participants may be instructed not to buy or keep unhealthy and tempting foods in the home and to avoid social situations in which they know they will be tempted to engage in unwanted eating behaviors, such as parties. While the behavioral strategy of stimulus control can be effective, it is often extremely difficult and even impractical to implement. For example, there are a number of situations (e.g., work) in which one cannot easily control or avoid the presence of tempting foods. In an environment in which food is plentiful and readily available, it would be impractical to try to control or avoid all situations in which one is likely to encounter palatable foods.

Both the LEARN program and the DPP include cognitive strategies to help individuals manage their food cravings. The primary cognitive strategies are distraction, confrontation, and cognitive restructuring. The LEARN program teaches participants to distract themselves from their cravings by doing or thinking of something else (e.g., planning a vacation) and to confront their cravings by arguing with them. Similarly, DPP recommends that participants talk back to the negative thoughts that are pushing them to give in to their cravings. In order to use this strategy, participants of DPP are taught to identify their problematic thoughts, label what type of thoughts they are (e.g., excuses), and then counter the negative thoughts with more positive thoughts.

As previously mentioned, the cognitive strategies used by these weight loss programs have not been evaluated in isolation, and so it remains unclear how successful these strategies are at helping participants manage their food cravings. Moreover, to the extent that distraction is functionally similar to suppression, it may be that these

techniques are not very effective. Recent evidence from experimental and analog studies confirms that attempts to suppress internal experiences may well be ineffective or perhaps even iatrogenic. Not only has suppression been shown to increase the intensity and duration of the suppressed thoughts (e.g., Borton, Markowitz, & Dieterich, 2005), but it has also been shown to increase related distress (Marcks & Woods, 2005). Consistent with these findings, Johnston, Bulik, and Anstiss (1999) demonstrated that attempts to suppress chocolate-related thoughts were associated with a subsequent increase in efforts to obtain chocolate.

The difficulty of directly controlling internal experience is further evidenced by research on the limited capacity for self-control, which indicates that the ability to control or override thoughts, emotions, urges, and behaviors is impaired by prior exertion of self-control (e.g., Muraven & Baumeister, 2000). In other words, self-control operates like a muscle in that it uses up energy such that less energy is then available for subsequent acts of self-control. For example, exerting self-control in one domain (such as coping with stress) reduces the amount of strength available for the exertion of subsequent self-control in a similar or dissimilar domain (such as resisting a temptation). Recently, research on the relationship between self-control and glucose (i.e., an important fuel for the brain's activities) has demonstrated that blood glucose levels decreased following performance of a self-control task and that low glucose levels following an act of self-control predicted poor self-control on a subsequent self-control task (Gailliot et al., 2007). In the area of weight control, this model of self-control as a limited resource suggests that one's ability to engage in healthy eating behavior in the face of temptation and cravings may depend on whether or not one has recently exerted self-control. To the

extent that this model is correct, individuals who are trying to lose weight or maintain weight losses and who are continuously exerting control over their cravings are likely to gradually lose the ability to resist impulses to overeat. Thus, the difficulty that individuals experience in controlling internal experiences (due to the paradoxical effects of direct control efforts and the limited capacity for self-control) may explain why existing behavioral and cognitive strategies for preventing and managing food cravings have had limited success.

### **1.5.2. Unreinforced Cue Exposure**

There are additional strategies for managing food cravings that have been examined but which are not currently incorporated in traditional behavioral weight loss programs. One strategy is unreinforced cue exposure. This type of exposure is based on the behavioral procedure of extinction, which holds that behaviors that are not reinforced will not persist. Exposure has been used to treat drug addictions and is based on the notion that cravings will extinguish following repeated exposures to cues associated with the drug while use of the drug is prevented. This prevents the positive reinforcement that would come from using the drug, which is thought to maintain the problematic behavior. This method has been shown to be effective in reducing alcohol abuse (Drummond, Tiffany, Glautier, & Remington, 1995). In the area of eating, Jansen et al (1992) has demonstrated that cue exposure used with binge eaters was effective in reducing the frequency of binges.

Unreinforced cue exposure has recently been applied to food cravings. Contrary to predictions, one study found that obese women continued to experience notable cravings following unreinforced exposure to the sight and smell of warm pizza



(Hetherington, 2001). A similar study in which individuals who reported experiencing chocolate cravings were exposed to chocolate cues in two sessions demonstrated that individuals who received the exposures experienced decreased cravings between the two sessions but not within the sessions (Van Gucht et al., 2008). The differing findings of these studies indicate that the effectiveness of unreinforced cue exposure for food cravings remains unclear.

### **1.5.3. Imagery-based Distraction**

More recently, researchers have examined the effectiveness of alternative distraction techniques for food cravings. Specifically, they have evaluated the use of visual and olfactory imagery techniques as an alternative to suppression of craving-related thoughts. These studies are based on the theory that mental imagery plays a key role in food cravings (Harvey et al., 2005; Kavanagh, Andrade, & May, 2005; Kemps, Tiggemann, & Hart, 2005). For example, Harvey, Kemps, and Tiggemann (2005) demonstrated that more vivid images of imagined food cravings were associated with stronger food cravings. Research from the field of cognitive psychology offers additional support for the role of mental imagery in the craving experience. Elaborated intrusion (EI) theory of desire (Kavanagh et al., 2005) proposes that intrusive thoughts about a desired food trigger cravings for that food. Because the thoughts are pleasurable, an elaboration process takes place in which relevant information about the desired food is brought from long-term memory into the person's working memory as images. If the person cannot obtain or consume the desired food (e.g., not available or prohibited against), these images can become distressing. According to this theory, if the person engages in another task that uses up the same working memory resources, the elaboration

process will be disrupted and the craving reduced. Kemps and Tiggemann (2007) tested this prediction with a sample of female undergraduates who completed a cue exposure protocol in which they were exposed to chocolate after having been instructed not to eat chocolate or chocolate-containing foods for a period of 24 hours. They then completed a visual (e.g., imagining the appearance of a rainbow), auditory (e.g., imagining the sound of a door squeaking), or olfactory (e.g., imagine the smell of grass that has been freshly mowed) imagery task. They found that the visual and olfactory imagery tasks were superior to the auditory task in reducing chocolate cravings. This finding indicates that distraction tasks that engage the same cognitive processes used to construct and maintain the craving (i.e., visual and olfactory imagery) are effective in reducing cravings. Given the positive outcomes of these initial studies, it is clear that continued research on imagery-based distraction techniques is warranted.

### **1.6. A New Approach: An Acceptance-based Strategy for Food Cravings**

Given the questionable success of existing interventions for responding to problematic or unwanted food cravings, an alternative approach may be needed. In response to the growing body of literature challenging the effectiveness of attempts to control internal experiences, a new form of cognitive-behavioral therapy (CBT) that utilizes an acceptance and mindfulness-based approach to the treatment of psychological problems has been developed (Forman & Herbert, under review; Hayes, Luoma, Bond, Masuda, & Lillis, 2006). This new approach may provide useful directions for identifying more effective strategies for managing unwanted food cravings such that adherence to dietary goals is improved and maintained.

The acceptance-based therapies are based on the premise that maladaptive, unwanted, or painful internal experiences do not necessarily have to be changed or eliminated in order for desired behaviors to occur. Instead, they recommend becoming mindful and accepting of all thoughts and feelings without trying to understand, evaluate, change, or eliminate them. This new approach promotes an accepting and non-judgmental stance toward thoughts and sensations (Teasdale et al., 2000). Examples of acceptance-based behavioral treatments include: Dialectical Behavioral Therapy (DBT; Linehan, 1993); Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999); Mindfulness-based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2001); and meta-cognitive approaches to CBT (Wells, 2000).

#### **1.6.1. Acceptance and Commitment Therapy (ACT)**

Of these new models of acceptance-based therapies, ACT has received the most attention and empirical support (Hayes et al., 2006). Therefore, the current study examined the effectiveness of strategies derived from ACT that had been modified to address food cravings. The goal of ACT is to experience internal events fully and without judgment in order to increase psychological flexibility (Hayes, Strosahl et al., 1999). Psychological flexibility is defined as the ability to adjust behavior so that it continually serves valued ends (Hayes, Strosahl et al., 1999). ACT interventions initially promote flexibility by helping individuals to contact the costs of psychological inflexibility, or in other words, the costs of avoiding or suppressing negative thoughts and emotions as a way to feel better or to behave in a certain way. Once these costs have been fully appreciated, individuals are taught processes that aim to increase psychological flexibility. These processes include: acceptance of the full range of psychological

experience, ongoing experiential contact with the present moment, cognitive defusion (i.e., experiencing psychological events with sufficient distance that they are not perceived as part of the self), promotion of a sense of self characterized by an observing phenomenological stance rather than as a collection of traits, committed action toward specific goals, and clarification of personal values. ACT aims to increase present moment awareness and acceptance of unwanted thoughts, feelings, and sensations in order to foster willingness to have such internal experiences without trying to change or eliminate them. Defusion and distinguishing self-as-context (i.e., experiencing a transcendent sense of self from which internal events arise) are processes that serve to help individuals increase their willingness to experience unwanted or negative thoughts and feelings without struggle. The ultimate purpose of such an accepting psychological stance is to promote actions that are consistent with personal values.

### **1.6.2. Empirical Evidence for ACT**

Research has demonstrated that an acceptance-based stance towards unwanted thoughts and feelings is effective in terms of decreasing distress and increasing tolerance (Levitt, Brown, Orsillo, & Barlow, 2004; Marcks & Woods, 2005; Twohig & Woods, 2004; Zettle, 2003). Specifically, acceptance has been shown to be effective in the treatment of chronic pain (Viane et al., 2003), reducing rehospitalization in psychotic patients (Bach & Hayes, 2002; Gaudiano & Herbert, 2006), reducing drug use in opiate addicts (Hayes et al., 2004) and the treatment of trichotillomania (Woods, Wetterneck, & Flessner, 2006). Studies of experimentally induced pain have demonstrated that ACT is more effective than cognitive-behavioral interventions at producing greater pain tolerance

(exposure to painful shock: Gutierrez, Luciano, Rodriguez, & Fink, 2004; cold pressor task: Hayes, Bissett et al., 1999).

One proposed reason for the possible advantage of ACT over traditional CBT is that it targets different mechanisms of change (for a review, see Forman & Herbert, under review; Hayes et al., 2006). Studies examining the mechanisms of change in ACT have focused mostly on the process variable of experiential avoidance, which ACT claims to weaken. Several studies have demonstrated that there is a significant association between experiential avoidance and treatment outcome (for a review, see Hayes et al., 2006). For example, Zettle (2003) conducted a study comparing ACT with systematic desensitization for mathematics anxiety. Whereas individuals in both interventions experienced successful reductions in mathematics anxiety, only individuals in the ACT condition had pre-treatment levels of experiential avoidance that were strongly associated with therapeutic change. A more recent study conducted by Forman and colleagues (2007) compared ACT and traditional cognitive therapy (CT) in the treatment of outpatients in a college counseling center who presented with symptoms of anxiety or depression. They found that while ACT and CT resulted in equivalent improvements in a number of outcome variables (e.g., anxiety, depression, quality of life, and functioning difficulties), they differed in the mechanisms of action through which these changes occurred. Exploratory analyses of mediation revealed that changes in the processes of “observing” and “describing” one’s internal experiences were more strongly associated with outcome for those receiving CT, whereas changes in “experiential avoidance”, “acting with awareness,” and “acceptance” were more strongly associated with outcome for those receiving ACT. Thus, these studies provide preliminary evidence that ACT

interventions facilitate therapeutic change by targeting different processes than those targeted by traditional CBT interventions.

### **1.6.3. Viability of an Acceptance-based Strategy for Food Cravings**

Despite the fact that basic cognitive research suggests that direct cognitive control strategies are often counterproductive, behavioral weight loss interventions continue to utilize these strategies. The use of cognitive strategies of questionable efficacy may partly explain why behavioral weight loss programs have failed to demonstrate substantial long-term improvements in weight loss. As suggested earlier, individuals may continue to have difficulty with adherence because they experience intense desires to eat certain foods that results in dietary non-adherence. An acceptance-based approach to food cravings may be a viable alternative as it has been shown to promote adaptive behavior in the face of powerful countervailing internal forces. Thus, the current study aimed to compare the effectiveness of an acceptance-based coping strategy for food cravings with a traditional control-based coping strategy.

Acceptance-based interventions provide an alternative way of responding to food cravings. From the ACT perspective, attempting to change or eliminate food cravings may be counterproductive. Thus, rather than utilize cognitive control strategies, such as distraction or confrontation, an acceptance-based approach advocates becoming aware of and defusing oneself from the cravings, while increasing one's willingness to experience distressing experiences that may be evoked from not giving in to one's cravings. Individuals are taught to notice when they have cravings, and rather than giving into these desires, they are encouraged to defuse from and accept their cravings and choose not to give into them (i.e., eating the craved food).

ACT also provides interventions that target cravings that arise in response to the presence of highly palatable and desirable foods. Traditional behavioral interventions recommend that individuals avoid food stimuli and situations associated with food stimuli. However, in today's obesogenic environment, this is impossible to do all of the time. Thus, when utilizing the recommended behavioral strategies to reduce the presence of food in the environment is undesirable or impossible, ACT provides an effective way of responding to cravings for food that may arise. Specifically, ACT encourages individuals to be aware of their cravings in response to environmental food cues and to be willing to have them rather than try to eliminate or give in to them.

### **1.7. Precursor to the Current Study**

In order to test the effectiveness of acceptance-based coping strategies for food cravings, Forman et al. (2007) conducted a study in which they compared acceptance-based strategies with control-based strategies for responding to chocolate cravings in a sample of undergraduate students. Participants were randomized to receive one of three groups: control-based coping strategy group, acceptance-based coping strategy group, or a no coping strategy group. All participants were given a bag of Hershey's Kisses® and instructed to carry them with them but not to eat them or any other chocolate for a period of 48 hours. Prior to the intervention, participants completed a self-report survey which assessed their initial susceptibility to the presence and availability of food in the environment. At the completion of the study, the bags of chocolate were returned and the Kisses® were counted to assess consumption. Additionally, participants were asked whether or not they had eaten other chocolate or chocolate-containing foods during the restriction period.

Results indicated that the overwhelming majority of participants across all three groups reported being able to refrain from eating the provided chocolate as well as any other chocolate. In terms of cravings, the results indicated that the relative effectiveness of the coping strategies depended on susceptibility to the presence of food as assessed using the Power of Food Scale (PFS; Lowe et al., 2009). Namely, the acceptance-based strategies were associated with better outcomes for participants with high PFS scores, whereas the control-based strategies were associated with better outcomes for participants with low PFS scores. This finding suggests that acceptance-based strategies may be superior to traditional control-based strategies in individuals highly susceptible to the presence of food.

### **1.8. Current Study**

The results of Forman et al. (2007) suggest that an acceptance-based strategy may be particularly helpful for overweight and obese individuals as they may be especially vulnerable to the food environment. Overweight or obese individuals may benefit more from learning ways to resist eating in response to their food cravings as it may lead to a decrease in their overall food intake, and thus, weight loss. However, in order to evaluate this hypothesis, it is necessary to examine the effectiveness of these coping strategies with a sample of overweight and obese individuals. Thus, the current study aimed to compare acceptance-based coping strategies with standard cognitive-based coping strategies for responding to food cravings in overweight or obese women. This study was restricted only to women on the basis that the majority of studies examining food cravings include only female participants (e.g., Gendall et al., 1997; Gilhooly et al., 2007; Hill & Heaton-Brown, 1994; Hill et al., 1991; Kemps, Tiggemann, Woods, & Soekov,



2004; Rodin et al., 1991; Schlundt et al., 1993; Stirling & Yeomans, 2004) and women are more likely to report food-related cravings (due in part to perimenstrual craving) (Weingarten & Elston, 1991).

In addition to using a clinical (i.e., overweight) sample, the present study expanded on the original craving study in several other ways. First, participants were required to restrict consumption of a variety of sweet foods, in addition to chocolate and chocolate-containing foods. Presumably, participants in Forman et al. (2007) could have satisfied their cravings for chocolate by eating a non-chocolate, sweet food. Second, the restriction period was extended from 48 to 72 hours in order to increase the difficulty of the challenge. Third, the length of the treatment interventions was extended from 30 to 90 minutes in order to allow more time for discussion, application to individual experiences, and in-group practice of the provided coping strategies. Fourth, we examined the moderating effects of emotional eating behavior in addition to susceptibility to the food environment. Finally, we utilized an objective measure of the “rebound effect” by presenting participants with the opportunity to consume candies after the restriction period ended without the knowledge that we would be measuring the amount eaten.

### **1.8.1. Aims and Hypotheses**

Broadly, this study aimed to test the relative effectiveness of acceptance-based and standard cognitive-based coping strategies for sweet cravings in overweight and obese women using an analog design. A control group was included to rule out threats to internal validity. The primary outcome variables were consumption of restricted foods and ratings of craving experience (e.g., frequency, associated distress).

The hypotheses were divided into three categories: preliminary, primary, and exploratory. Preliminary hypotheses refer to predicted outcomes that we expected based on prior research. Primary hypotheses were the main predictions that this study was designed to test. Exploratory hypotheses refer to hypotheses that were of interest but which were not the key focus of this study.

In terms of preliminary hypotheses, we first predicted that craving ratings would be positively associated with consumption of sweets. This hypothesis was based on the assumption that individuals who report greater craving ratings would be more likely to consume the restricted foods. This was shown to be the case in the original study (Forman, Hoffman et al., 2007). Results indicated that individuals who consumed chocolate had greater scores on measures of cravings. Second, we predicted that greater susceptibility to the food environment would be associated with higher ratings of cravings and greater consumption of sweets during the restriction period. This prediction was based on research suggesting that food cravings arise in response to environmental cues (Cornell et al., 1989), and the theory that overweight and obese women may experience greater difficulty in resisting their cravings which leads them to engage in unwanted eating behaviors (e.g., Bjorvell et al., 1985). Thus, overweight and obese women who are highly susceptible to the power of food may have an especially difficult time resisting their sweet cravings. Third, we predicted that greater self-reported tendency to eat when emotionally upset would be associated with greater cravings and consumption of sweets during the restriction period. This prediction was based on previous findings that food cravings arise in response to negative emotional states (e.g.,

Hill et al., 1991) and that overweight and obese women may experience greater difficulty in resisting their cravings (e.g., Bjorvell et al., 1985).

Three primary hypotheses were evaluated. First, we predicted that the acceptance-based coping strategy group and the standard cognitive-based coping strategy group would be more effective in terms of sweet cravings and consumption than the no coping strategy group. The prediction that both coping strategy groups would be more effective than the no coping strategy group was based on the expectation that learning and practicing strategies for dealing with sweet cravings would help participants cope with and avoid acting on their sweet cravings. We did not predict that one coping strategy group would be more beneficial than the other. This was based primarily on the results of the original craving study, which did not find a main effect of group (Forman, Hoffman et al., 2007). Rather, they found that the relationship between coping strategy group and outcome was dependent on the individual's susceptibility to the food environment. Accordingly, we expected that in the current study the relationship between coping strategy group and outcome would be better explained by examining moderating variables.

The second primary hypothesis predicted that initial susceptibility to the presence and availability of food would moderate the relationship between coping strategy group and outcome variables such that greater susceptibility to the food environment would be associated with better outcome for those in the acceptance-based coping strategy group while low to moderate susceptibility to the food environment would be associated with better outcome for those in the standard cognitive-based coping strategy group. This prediction was based on the findings of Forman et al. (2007) in which they found that

susceptibility to the food environment moderated outcome. (Although we expected that our sample of overweight and obese women to have greater susceptibility to the food environment as compared to normal weight individuals, we still expected there to be variability within the sample.) This hypothesis was supported by the theory that an acceptance-based approach is most beneficial when used in response to thoughts and feelings that the individual experiences as very distressing and which he or she either struggles to avoid or engages in behaviors that give in to them. In contrast, standard cognitive-based coping strategies may be equally, if not more effective, when used in response to unwanted thoughts and feelings that while negative or unpleasant are not to such a degree that the individual engages in a great struggle with them.

The third primary hypothesis predicted that tendency to eat in response to negative emotions would moderate the relationship between coping strategy group and outcome variables such that high levels of emotional eating would be associated with better outcome for those in the acceptance-based coping strategy group while low levels of emotional eating would be associated with better outcome for those in the standard cognitive-based coping strategy group. This hypothesis was based on previous studies which have demonstrated significant correlations between emotional eating and food cravings (e.g., Hill et al., 1991). Specifically, we theorized that individuals who have a tendency to engage in emotional eating may experience emotion-triggered food cravings that they perceive as being very difficult to resist. For these individuals, we predicted that they may be better assisted in managing their cravings with acceptance-based coping strategies that advocate accepting rather than attempting to control their negative emotional states and their cravings. Standard cognitive-based strategies may not be as

effective for individuals who tend to engage in eating to manage their emotions as these strategies have been shown to back-fire when used to manage thoughts and feelings that are experienced as especially distressing or intolerable.

This study also included two exploratory hypotheses, which while not the main focus of this study, were of interest. First, we predicted that the acceptance-based coping strategy group would consume less food during a test of the “rebound effect” as compared to the standard cognitive-based coping strategy group and the no coping strategy group. This prediction was based on the existing literatures on thought suppression and self-control theories which suggest that we have a limited ability to control our internal experiences and our behaviors (e.g., Johnston et al., 1999; Muraven & Baumeister, 2000). Accordingly, when the external pressure to resist sweets is taken away, individuals may subsequently consume the formerly prohibited food. In order to test this hypothesis, participants were given the opportunity to consume candy during a taste test that took place after a period of sweets restriction had ended. They were asked to try each candy and to rate their taste preferences. The study personnel surreptitiously measured how much candy each participant consumed, which represented the “rebound effect.” We expected that whether or not participants engaged in this “rebound effect” depended on coping strategy group. Specifically, we expected that individuals who were in the acceptance-based coping strategy group would be better able to resist the “rebound” test given that these strategies have been shown to counteract the negative effects of cognitive control.

The second exploratory hypothesis predicted that among those who were highly restrained in their eating, the standard cognitive-based group would be more effective for

those who are currently dieting whereas the acceptance-based group would be more effective for those who are not currently dieting. This hypothesis was based on the finding that the relationship between dietary restraint and counter-regulatory eating is moderated by current dieting status such that individuals who are highly restrained and currently dieting tend not to engage in counter-regulatory eating, and in fact decrease their eating following a preload, while those who are highly restrained and not currently dieting are more likely to engage in this type of eating behavior (Lowe, 1994; Lowe et al., 1991). On this basis, we theorized that highly restrained eaters who were not currently dieting may have a more difficult time coping with and resisting their sweet cravings. These individuals may be better assisted in managing their cravings with acceptance-based coping strategies that have been shown to be effective for responding to especially distressing internal experiences. In contrast, highly restrained eaters who are currently dieting may have a less difficult time coping with and resisting their sweet cravings. Accordingly, they may be better assisted with standard cognitive-based coping strategies which may be more effective when the internal experiences are not perceived as especially problematic or distressing.

## **2. METHODS**

### **2.1. Participants & Recruitment**

Participants were recruited from the Philadelphia area using flyers, email, university newsletter, and news advertisements. Eligibility criteria were assessed by means of a phone screening. Potential participants were considered eligible if they were female, between the ages of 18 and 60, fluent in English, had a body mass index (BMI) 25 kg/m<sup>2</sup> or higher, had access to the internet and/or mobile phone, and reported that they

experienced (on average, and outside of their menstrual cycle) at least *a moderate amount* of urges or cravings for sweet foods and they consumed sweets at least a few times per week. In order to reduce demand characteristics, potential participants were also asked the extent to which they craved and consumed savory foods. Participants were excluded if they were lactating or pregnant; diabetic; had a history in the past ten years of bulimia nervosa, anorexia nervosa, or binge eating disorder; were allergic or unable to eat chocolate; currently or recently (i.e., past three months) participated in a formal weight loss program; and currently taking medications for weight loss or medications known to affect weight.

## **2.2. Procedures**

Eligible participants were randomized to one of three intervention groups: a standard cognitive-based coping strategy group (CBG), an acceptance-based coping strategy group (ABG), or a no intervention group (NIG). During the first group session, additional information on participation was provided and informed consent to participate in the study was sought. Participants were informed that the purpose of the study was to measure the intensity of cravings for sweet foods, and how people cope with these cravings. After participants had given their informed consent, they completed baseline questionnaires. Demographics information was also obtained, including age and ethnicity. While participants were completing the baseline questionnaires, height and weight were individually measured in a separate location.

Participants were each provided a transparent container of sweet foods. The sweet foods (i.e., Hershey's Kisses®, Starbursts®, and Reese's® peanut butter cups) were individually packaged. They were instructed to keep the container with them at all

times for a period of 72 hours at which point they were asked to return them to a pre-designated drop-off location. The restriction period took place during weekdays as we expected that eating behaviors during the weekends may differ. Participants were told to “try their best” not to eat the provided sweet foods or to consume other sweet foods or drinks during the study period. Sweet foods were defined for the participants as foods rich in sugar that are typically sweet tasting and often thought of as dessert or snack-type foods. Artificial sweeteners (e.g., Splenda®, Equal®) and foods containing artificial sweeteners were also prohibited. Participants were provided a list of common examples of sweets that they were asked to avoid consuming (see Appendix A). Additionally, each participant received the same number of sweets and each sweet was marked so as to detect any missing foods or substitutions (e.g., small cut in the packaging). Once the sweets had been returned, they were counted and checked for any with missing marks.

During the 72-hour restriction period, participants were asked to complete ratings of their sweet cravings and consumption at four pre-determined time points per day via provided booklets (with the exception of the third day on which they completed the ratings at two time points only). They received emails, text messages, and/or phone calls to remind them to complete the ratings at the pre-determined time points. The final assessment took place at the end of the 72-hour restriction period. Participants were asked to come to a pre-designated area to return the container of sweets and complete final study measures, which included ratings of treatment acceptability and utilization. As a check, participants were asked to indicate if they followed the instructions to keep the container of sweets with them at “virtually all times” and if they were honest on the rating forms about whether they ate sweets. During the final assessment, a taste test was



conducted in order to assess whether participants increased their eating after the externally-imposed restriction period had ended (i.e., the “rebound effect”). The procedures were based on those described in studies utilizing laboratory taste tests (e.g., Martin, O’Neil, Tollefson, Greenway, & White, 2008). Participants were instructed not to eat during the two hours prior to their scheduled appointment. They were told that the purpose of the taste test was to examine possible changes in taste perceptions of sweet foods following a period of restriction of such foods. Bowls of three different types of candies (Skittles®, M&M’s®, and Reese’s Pieces®; 10 oz, presented in one liter serving bowls) were placed on a table, and the participants were asked to taste each candy and complete taste ratings. Specifically, they were instructed to take at least one bite of each candy before completing the ratings. They were told that they could eat as much of each type of candy as they would like. As used in similar studies, participants were asked to rate the following properties: sweetness, saltiness, bitterness, pleasantness, and satisfaction (e.g., Martin et al., 2008). Each bowl contained enough candy so that it would not seem obvious to the participants that study personnel could tell how much they consumed. The bowls were refilled between participants. Consumption of the candies was surreptitiously measured using a food scale. Following the taste test, participants were asked if they believed that study personnel would know how much candy they consumed during the taste test. Finally, participants were debriefed as to the purpose of the study procedures including disclosure of the true purpose of the taste test, which was to measure consumption of a previously restricted food.

### **2.3. Measures**

The following measurements were conducted (see Appendix B):

**Weight.** Weight was determined with the patient in street clothes (without shoes) using a standardized Secca scale.

**Height.** Height was measured using a tape measure.

**Craving.** Measures of both trait- and state-based cravings were administered. The Food Craving Questionnaire-Trait version (FCQ-T; Cepeda-Benito et al., 2000) is a 10-item self-report measure which was administered at baseline to assess trait-based cravings. This measure has been shown to have good internal consistency and excellent test-retest reliability (Cepeda-Benito et al., 2000; Vander Wal, Johnston, & Dhurandhar, 2007). During the three days following the group session, participants completed measures of state-based sweet cravings at four time points (11am, 4pm, 8pm, and before bed; on the third day, participants completed the ratings at 11am and 4pm only). Selected items from the Food Craving Questionnaire-State version (FCQ-S; Cepeda-Benito et al., 2000) were administered. For this study, the instructions were altered to ask participants to base their responses on their experience of cravings in the time frame since the last assessment. Vander Wal et al. (2007) evaluated the psychometric properties of the FCQ-S with a sample of overweight and obese individuals and found that the measure had good internal consistency (Cronbach's  $\alpha = .88$ ). These questions ask participants to indicate on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*) how much they agree with the comment at the time they are filling it out. A total score for FCQ-S was created at each time point by summing the items. Participants were also asked to provide ratings of craving frequency and associated distress using single-item questions based on the original craving study (Forman, Hoffman et al., 2007). These items asked participants to use a 5-point Likert scale to assess craving frequency, i.e., "Over the past few hours, how

often did you crave sweets?” (1 = *not at all* to 5 = *every moment*), and distress associated with cravings, i.e., “If you had cravings for sweets, how distressing did you find them?” (1 = *not at all* to 5 = *extremely*). Both for simplicity and because we did not hypothesize differences across time, three summary craving variables were created by averaging the scores obtained at the ten time points for each of the three craving variables: FCQ-S, craving frequency, and craving distress.

***Power of Food Scale.*** The Power of Food Scale (PFS; Lowe et al., 2009) is a 15-item self-report measure assessing the extent to which food’s availability or presence influences behavior, thinking, and feelings. The items are rated using a 5-point Likert scale (1 = *I don’t agree* to 5 = *I strongly agree*) and are divided into three factors: Food Available, Food Present, and Food Tasted. Food Available items measure how the availability of food affects a person’s thoughts and feelings. Examples of Food Available items are as follows: “I find myself thinking about food even when I’m not physically hungry” and “It’s scary to think of the power that food has over me.” Food Present items reflect how much a person believes they are affected by the actual presence of food in the environment. Examples of Food Present items include: “If I see or smell a food I like, I get a powerful urge to have some” and “When I’m around a fattening food I love, it’s hard to stop myself from at least tasting it.” The last factor, Food Tasted, assesses the pleasure that the person experiences because of the taste of food. Examples of Food Tasted items include: “When I eat delicious food I focus a lot on how good it tastes” and “It is very important to me that the foods I eat are as delicious as possible.” Lowe et al. (2009) found that the PFS has adequate internal and test-retest reliability.

***Emotional Eating.*** Tendency to engage in emotional eating was assessed using the Emotional Eating subscale of a revised version of the Eating Inventory (EI; formerly known as the Three-Factor Eating Questionnaire; Stunkard & Messick, 1988). The Eating Inventory is a commonly-used questionnaire for assessing eating behavior. The EI has been validated and all scales have good internal consistency and test-retest reliability (Laessle et al., 1989b; Stunkard & Berthold, 1985). A recent Swedish study suggested that a revised 21-item version of the EI has improved psychometric properties (Tholin, Rasmussen, Tynelius, & Karlsson, 2005). The 21-item version of the EI consists of 3 dimensions: cognitive restraint, emotional eating, and uncontrolled eating. The proposed study used the 6-item Emotional Eating subscale of the 21-item EI. Items are rated on a 4-point Likert scale. Examples of EI-Emotional Eating items include: “I start to eat when I feel anxious” and “When I feel sad, I often eat too much.” Higher scores are indicative of greater tendency to engage in emotional eating.

***Dietary Restraint.*** Dietary restraint was assessed using the Cognitive Restraint subscale of the 21-item Eating Inventory (EI; Tholin et al., 2005). The EI-Cognitive Restraint subscale assesses both cognitive and behavioral strategies for reducing food intake. The Cognitive Restraint scale of the original EI has been shown to be correlated with negative energy balance (Williamson et al., 2007). The Cognitive Restraint scale of the 21-item EI is made-up of 6 items rated on a 4-point Likert scale. Examples of Cognitive Restraint scale items include: “Sometimes when I start eating, I just can’t seem to stop” and “I consciously hold back on how much I eat at meals to keep from gaining weight.” Higher scores are indicative of greater cognitive restraint.

***Dieting.*** Dieting was assessed by asking participants whether they are currently dieting. A single question to assess current dieting has been used in similar studies (e.g., Lowe et al., 1991).

***Sweet Food Consumption.*** Sweet food consumption was assessed using both self-report and objective measures. Participants were asked to rate how much sweet food they ate and how much sweet drink they consumed using a 5-point Likert scale based on their consumption relative to the quantity of a Snickers® bar and a soda can, respectively. They completed these ratings at four time points (11am, 4pm, 8pm, and before bed) for the three days following the group session (on the third day, participants completed the ratings at 11am and 4pm only). Pearson correlations revealed strong associations between consumption of sweet food and drink (Day 1:  $r = .76, p < .001$ ; Day 2:  $r = .64, p < .001$ ; Day 3:  $r = .66, p < .001$ ). Both for simplicity and because we did not hypothesize differences across time, a single consumption score was created by averaging the ten time points for food and drink consumption, creating standardized scores, and combining food and drink consumption into a single consumption variable.

In addition to self-reported consumption, each participant also received a container containing individually wrapped sweet foods (Hershey's Kisses®, Starbursts®, and Reese's peanut butter cups®) and each food inside the container was individually marked (e.g., cut in the wrapping). The containers of sweets were collected at the end of the three-day study period. The sweet foods were counted and compared to the number of foods originally included in the container<sup>1</sup>. The returned candy was also checked for the

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<sup>1</sup> Several participants indicated that others had consumed from their candy containers or that some of the candies had fallen out (as was possible given that the containers were loosely sealed for the intended purpose of allowing easier access). This information was taken into consideration in determining whether

identifying marks. Only three Hershey's Kisses® in three different candy containers (each belonging to CBG members) did not have the identifying marks (and one of these containers had an extra Kiss®). Two of the three containers were also missing additional candies. While study personnel checked each container prior to distribution in order to ensure that the accurate number of candies were included with the correct identifying marks, we are not wholly confident that the missing marks on the Kisses® were not due to experimenter error. For this reason, the Kisses® missing the identifying marks were counted. Because of low consumption rates, candy container consumption was dichotomized to reflect participants' status as either candy abstinent or non-abstinent.

***Rebound Effect.*** In order to assess whether participants engaged in “rebound eating,” individual taste tests were conducted. All participants were asked not to eat during the two hours prior to their scheduled appointment. Prior to beginning the taste test, participants were asked if they remembered to fast and were instructed to complete ratings of hunger level using a 9-point Likert scale. Participants who reported that they did not fast or who did not respond to this question were excluded from taste test analyses on the basis that having eaten just prior to the taste test would impact how much they consumed, which was the primary variable of interest. Participants were asked to taste three different types of candies (Skittles®, M&M's®, and Reese's Pieces®; 10 oz, presented in one liter serving bowls) and to complete ratings of the following properties: sweetness, saltiness, bitterness, pleasantness, and satisfaction (as used in Martin et al., 2008). Consumption of the candies was surreptitiously measured using a food scale and

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or not to count the candy as missing, and decisions were made on a case by case basis by considering additional evidence (such as overall compliance and self-report ratings of honesty).

a difference score was calculated to determine the amount of each food (measured in grams) consumed by the participant.

***Treatment Acceptability.*** A measure of treatment acceptability was created for the purpose of this study. Several of the items were based on those included in the Treatment Acceptability Questionnaire (Hunsley, 1992). Following the group interventions, participants were asked to rate (using a 5-point Likert scale) how often they thought they would use the provided coping strategies (1 = *never* to 5 = *frequently*) as well as the extent to which they believed they would be useful in helping them resist acting on their cravings (1 = *not at all helpful* to 5 = *very helpful*). At the end of the 72-hour restriction period, participants were asked questions designed to assess the effectiveness and satisfaction with the coping strategies using 5-point Likert scales (1 = *not at all effective* to 5 = *very effective*; 1 = *not at all satisfied* to 5 = *very satisfied*). Additionally, participants were asked the extent to which they found specific strategies to be helpful using a five-point Likert scale (1 = *not at all helpful* to 5 = *very helpful*). They were also asked to rate how difficult they found the respective coping strategies to understand and to implement using a 6-point Likert scale (1 = *very difficult* to 6 = *very easy*). Finally, participants were asked to rate the extent to which they believed they would be able to maintain the strategies they learned and the extent to which they believed they would be able to consistently resist acting on their cravings for sweets during the months following the end of the study using a 5-point Likert scale (1 = *never* to 5 = *always*).

***Treatment Utilization.*** Several assessment tools were included to determine the extent to which participants in the coping strategy groups understood and used the coping

strategies they were taught. First, participants were given a quiz at the end of the group intervention to assess their memory and understanding of the main concepts discussed in their respective workshops. Second, an end-of-study survey was administered during the final assessment, which took place at the end of the 72-hour restriction period. This survey asked participants to rate the extent to which they attempted to use specific coping strategies (e.g., thinking of something else, accepting the craving without trying to change it) and the extent to which they found the strategies to be helpful in coping with their cravings. Included in the list of strategies were behavioral strategies that were not explicitly recommended in either intervention group; namely, keeping sweets out of sight and eating other foods besides sweets.

#### **2.4. Coping Strategy Groups**

Each group was approximately two hours in length. During the first 30 minutes, the group leaders provided additional study information, obtained informed consent, and administered baseline measures. The respective interventions were delivered immediately afterwards for approximately 90 minutes. Both intervention groups encouraged discussion of the ideas presented as well as utilized experiential exercises to practice the respective strategies. Behavioral strategies, such as stimulus control, were not included in either intervention group because we wanted to isolate the cognitive and acceptance-based interventions and because we were instructing participants to remain in contact with triggering stimuli by asking them to carry the candy container with them during the restriction period. Participants in the cognitive-based group were given the behavioral recommendation to change activities to help cope with cravings; however, this strategy was recommended as a distraction technique, and they were reminded to have the candy



container with them. Detailed outlines of the intervention groups can be found in Appendix C.

***Acceptance-based Coping Strategy Group.*** The intervention components of the acceptance-based coping strategy group were drawn from Acceptance and Commitment Therapy (ACT; Hayes, Strosahl et al., 1999) and the treatment manual for the Acceptance-based Weight Loss Program (Forman, Butryn, Hoffman, & Herbert, unpublished). Participants were taught that cravings for sweets are normal and expected, and are outside of voluntary control. It was explained that attempts to control internal experiences, such as food cravings, can paradoxically result in an increase in the intensity, frequency, or associated distress of the experiences that one is trying to avoid. Instead of attempting to control cravings, participants were urged to *accept* them as they are without trying to change them. Participants were also taught to first become *mindful* of their cravings so that they can then *defuse* from or “step back from” the cravings and see themselves having them. The principle of *willingness* was emphasized which refers to the ability to experience cravings without taking the usual actions (e.g. eating the desired food) that would reduce the unpleasant experience. Finally, participants were taught how the principles described facilitate *committed action*, i.e., the ability to behave in accordance with their goals and values rather than to manage unpleasant internal experiences.

***Standard Cognitive-based Coping Strategy Group.*** The standard cognitive-based coping strategy group was based on session content from the LEARN Program for Weight Maintenance (Brownell, 2000) and the Diabetes Prevention Program (The Diabetes Prevention Program Research Group, 1999) as well as strategies from the Beck

Diet Solution (Beck, 2007). Broadly, the cognitive-based coping strategy group aimed to teach participants how to distract from and control their food cravings and thoughts about food cravings. Participants were taught that their cravings are strongly connected to the attention they give to the food (e.g., smell and sight sensations) as well to internal appetite-related processes (e.g., hunger and cravings). Accordingly, they were given techniques to help *distract* themselves from their cravings and thoughts about their cravings (e.g., positive imagery and mind games). In order to help gain control over how they respond to their cravings, participants were taught how to *identify distortions* in their thoughts about their cravings. They were then taught how to *restructure* their thoughts so that they were more positive and adaptive in terms of helping them resist their cravings.

***No Coping Strategies Group.*** Participants in the no coping strategies group did not receive an active coping strategy. Instead they were simply told that they should do their best not to consume sweets and that this was the case even if they developed a strong urge or impulse to do so.

### 3. RESULTS

#### 3.1. Descriptive Statistics

A total of 73 participants met eligibility requirements and were enrolled in the study. One participant who completed the study had been in the hospital for the duration of the sweet restriction period, and because this likely impacted her daily eating routines, she was excluded from analyses. Age ranged from 18 to 59 ( $M = 32.51$ ,  $SD = 13.51$ ). The ethnic make-up was as follows: 38.9% White or European American ( $n = 28$ ), 31.9% African American ( $n = 23$ ), 11.1% Asian or Pacific-Islander ( $n = 8$ ), 11.1% Multiracial ( $n = 8$ ), 2.8% Asian American ( $n = 2$ ), 2.8% Latino ( $n = 2$ ), and 1.4% Caribbean or Haitian

( $n = 1$ ). Approximately 10% of the sample was born outside of the United States ( $n = 7$ ). The average BMI was 33.25 ( $SD = 6.50$ , range = 25.46 – 57.69)<sup>2</sup>. Twenty-one participants (29.2%) indicated that they were currently dieting and five participants (6.9%) indicated that they were “sort of” dieting, were “on and off” dieting, or were watching what they ate. Of those who were dieting or quasi-dieting, 21 (80.8%) were dieting to lose weight, 3 (11.5%) were dieting to maintain weight and avoid weight gain, and 2 (7.7%) did not respond. In terms of employment status, 35.7% were full-time ( $n = 25$ ), 32.9% were part-time ( $n = 23$ ), 4.3% were occasional ( $n = 3$ ), and 27.1% had no income ( $n = 19$ )<sup>3</sup>. Over half (58.6%,  $n = 41$ ) of the sample were students, of which 78.0% ( $n = 32$ ) were full-time and 70.7% ( $n = 29$ ) were undergraduate (29.3% graduate,  $n = 12$ ). In terms of marital/relationship status, 52.9% were single/no current romantic partner ( $n = 37$ ), 22.9% were married/living with partner ( $n = 16$ ), 20.0% were in a relationship but not living with partner ( $n = 14$ ), 2.9% were divorced ( $n = 2$ ), and 1.4% were widowed ( $n = 1$ ). Tables 1 and 2 show descriptive statistics for the demographic characteristics of the sample and baseline measures<sup>4</sup>.

In order to determine if there were differences between groups at baseline, continuous variables were compared using analyses of variance (ANOVAs) and categorical variables were compared using chi-square analyses. Due to insufficient power to detect significant differences between treatment groups, effect sizes were examined.

Partial eta squared ( $\eta_p^2$ ) was used to estimate the degree of association for continuous

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<sup>2</sup> One participant exceeded the weight limit of the scale and so her self-reported weight was used to determine BMI.

<sup>3</sup> Data for employment, student, and marital/relationship status were missing for two participants.

<sup>4</sup> Due to experimenter error, the baseline measures for two participants (both in NIG) were collected several weeks after they participated in the study. Their responses were included in the analyses based on the assumption that the measures are assessing trait characteristic and are unlikely to be affected by the period of abstinence (and even if slightly affected, they would likely have reverted back during the weeks between).

variables using a one-way analysis of variance (ANOVA), according to the following definitions: small = 0.01; medium = 0.06; large = 0.14 (Cohen, 1988). For the chi square analyses, the degree of association was evaluated using phi and was examined using the following definitions: small = 0.1, medium = 0.3, and large = 0.5 (Rosenthal, 2001). The chi square analyses should be considered with caution as the assumption of “minimum expected cell frequency” (i.e., at least 80% of cells have expected frequencies of five or more) was violated. As seen in Tables 3 and 4, four variables were associated with moderate effect sizes: age, PFS, FCQ-T, and Born-US. Among these, the PFS and FCQ-T were found to be moderately associated with the dependent measures of sweet cravings (see Table 5). Additionally, Born-US was found to be a moderate predictor of a dependent measure of sweet cravings (see Table 6).

### **3.2. Exclusion of No Intervention Group**

Based on certain patterns of findings and also on anecdotal evidence, it appears that the data for participants in the NIG is flawed. Specifically, we suspect that participants in the NIG may have consumed more sweets than they reported and that they may not have carried the sweets container with them at all times. There are several reasons to question the validity of their consumption rate. For instance, the NIG was given no help in reducing consumption and reported greater sweet cravings than the active intervention groups, but the NIG reported the least sweet consumption. Participants in the NIG may have had less incentive to be honest in self-report ratings of consumption because of limited interaction with study personnel relative to the active intervention groups (i.e., approximately 30 minutes as compared to two hours) and disappointment in not being randomized to a group that provided coping strategies (as

anecdotally, many participants expressed). Two NIG participants indicated on the end-of-study survey that they did not keep the container of sweets with them for a large part of the restriction period. Specifically, one indicated that she did not do so for the “majority of the time” because it was “too hard.” Moreover, the minimal time that NIG participants spent with study personnel did not allow sufficient time for clarification as to what foods and drinks counted as “sweets,” and thus, it is possible that these participants would have unknowingly broken the “sweets restriction rule,” and that this consumption would therefore not have been recorded. (Anecdotally, a number of participants in the active interventions required clarifications about what sweets count and such clarifications were often requested throughout the two hour groups.) In addition to the problem of the questionable validity of their sweets consumption data, the NIG differed at baseline in variables that were moderately related to primary dependent variables, which further makes comparisons with this group difficult to interpret. (As seen in Tables 7-9, comparison of baseline variables between CBG and ABG did reveal moderate differences between groups in age and the EI-Emotional Eating subscale; however, the relationships between both variables and primary dependent variables were small in size.)

On the tentative conclusion that the NIG data was faulty, the first series of analyses are conducted without NIG participants. However, given that we cannot be sure that NIG participants were noncompliant, the core results are re-presented with the NIG group included in a concise format. When the NIG is included, the following variables are included as covariates on the basis that they differed across the three groups and were moderately associated with primary dependent variables: PFS, FCQ-T, and Born-US.

### 3.3. Statistical Power

Based on the data collected, observed power was computed for the primary moderation hypotheses. For the 2 (group: CBG and ABG) by 3 (susceptibility to the food environment: low, moderate, high) analyses of variance (ANOVAs), with an  $n$  of 47, an alpha set at .05, and effect sizes ranging from .10 to .23, the observed power ranged from .31 to .76, depending on which dependent variable was being assessed. For the ANOVAs examining the interaction effect of group (2 levels: CBG and ABG) and tendency to engage in emotional eating (three levels: low, moderate, and high), with an  $n$  of 48, an alpha set at .05, and effect sizes ranging from .01 to .11, the observed power ranged from .09 to .48. Given that this study was largely underpowered, results of statistical analyses are discussed in terms of overall patterns and effect sizes, rather than statistical significance.

### 3.4. Treatment Acceptability and Utilization

Participants were given quizzes at the end of the group interventions to assess their memory and understanding of the main concepts discussed in their respective workshops. The majority of participants in the CBG (88.5%) and the ABG (68.2%) demonstrated mastery, defined as scoring 75% or above on the quiz. The difference between the two groups, while not significant, was moderate in size ( $t_{(46)} = 1.50$ ,  $p = .14$ ,  $d = .43$ ) and suggests that participants in the CBG demonstrated greater understanding of their respective coping strategies.

Independent samples t-tests were conducted in order to determine if there were differences between groups on ratings of treatment acceptability. Cohen's  $d$  was calculated as a measure of effect size and was evaluated using the following definitions:

small = 0.2; medium = 0.5; and large = 0.8 (Cohen, 1988). The differences between groups on ratings of acceptability were small to medium in size and were not significant (see Table 10). The majority of ABG (86.3%) and CBG (73.1%) participants indicated that they would use the coping strategies *often* to *frequently* during the three-day restriction period, and the majority of ABG (77.3%) and CBG (73.1%) believed that the respective coping strategies would be *helpful* to *very helpful*. The differences between the two groups on expected frequency of use ( $t_{(46)} = -.68, p = .50, d = -.31$ ) and expected helpfulness ( $t_{(46)} = -.37, p = .71, d = .12$ ) were small and not significant.

At the end of the 72-hour restriction period, participants were asked to indicate if they followed the instructions to keep the container of sweets with them at “virtually all times” and if they were honest on the rating forms about whether they ate sweets. All participants in ABG and CBG indicated that they kept the sweet container with them for the majority of the restriction period and that they were honest in their ratings of sweet consumption. At this time, participants were also asked to complete ratings of the respective coping strategies. The majority of ABG (81.8%) and CBG (76.9%) participants indicated that the strategies they learned were *easy* to *very easy* to understand. CBG participants reported having an easier time implementing the respective strategies; specifically, 80.8% of CBG participants reported that the strategies were *somewhat easy* to *very easy* to implement, while only 63.7% of ABG participants reported that the strategies were *somewhat easy* to *easy* to implement and no ABG participants indicated that the strategies were *very easy* to implement. This difference while non-significant was associated with a moderate effect size ( $t_{(46)} = 1.34, p = .19, d = .39$ ). The majority of participants in both active interventions indicated that they found

the strategies to be *effective* to *very effective*. No significant differences were found between the two groups and effect sizes ranged from small to medium (see Table 10).

Participants were also asked to rate the extent to which they attempted to use specific coping strategies (e.g., thinking of something else, accepting the craving without trying to change it) and the extent to which they found these strategies to be helpful in coping with their cravings (see Table 11 for percentages per group). Independent samples t-tests were conducted to examine group differences in the extent to which participants attempted the strategies and the extent to which they found them successful. All of the ABG and CBG participants reported engaging in at least one of the assigned strategies, with the means suggesting that participants made moderate to strong use of nearly all strategies. As indicated in Table 12, ABG strategies were, on the whole, used more frequently by participants assigned to the ABG, and vice-versa. For example, ABG participants attempted the strategy of accepting the craving as it is without trying to change it more often than those in the CBG ( $t_{(42.96)} = -5.63, p < .001, d = -1.63$ ). Conversely, CBG participants attempted the strategy of challenging negative thoughts more often than those in ABG ( $t_{(44)} = 3.99, p < .001, d = 1.18$ ).

### 3.5. Preliminary Hypotheses

***Preliminary Hypothesis 1:*** Craving ratings will be positively associated with consumption.

In order to test this hypothesis, a Pearson correlation was calculated between cravings, including trait-based cravings assessed at baseline (FCQ-T) and state-based cravings assessed during the restriction period (FCQ-S, craving frequency, and craving distress), and self-reported consumption. As predicted, both trait- and state-based



cravings were positively associated with self-reported consumption. The correlations between the measures of cravings and consumption were small to moderate in size (ranging from .27 to .45; see Table 13)

In addition, logistic regressions were conducted in order to assess the impact of measures of cravings on the likelihood that respondents would consume from the candy container (see Table 14). As predicted, state-based measures of cravings were significant predictors of consumption from the candy containers. Specifically, craving frequency was associated with an Odds Ratio of 5.06 ( $p = .02$ ), which suggests that participants who reported more frequent cravings were over five times more likely to consume from the candy container as those who reported fewer cravings. Similarly, craving distress was associated with an Odds Ratio of 4.41 ( $p = .03$ ), which suggests that participants who reported more distressing cravings were over four times more likely to consume from the candy container. In contrast, the impact of trait-based cravings (FCQ-T) was not a significant predictor of candy container consumption.

***Preliminary Hypothesis 2:*** Susceptibility to the food environment will be positively associated with cravings and consumption.

For this preliminary hypothesis, Pearson correlations were calculated to examine the relationship between the PFS and measures of trait- and state-based cravings and self-reported consumption of sweets. As seen in Table 15, results of correlational analyses indicated that the relationships were in the predicted directions, namely that greater PFS scores were associated with greater cravings. Specifically, the PFS was significantly and strongly correlated with trait-based cravings ( $r = .78$ ). The relationships between the PFS and state-based cravings were moderate in strength and significantly correlated ( $r$  ranged

from .29 to .32). The relationship between PFS and self-reported *consumption*, on the other hand, was small to moderate in magnitude and not significant. A logistic regression performed to assess the impact of the PFS on the likelihood that respondents would consume from the candy container revealed that the PFS was not a statistically significant predictor of candy container consumption. Contrary to expectations, a negative B value was found, which suggests that greater susceptibility to the food environment was associated with a decreased probability of consuming from the candy container (see Table 16).

***Preliminary Hypothesis 3:*** Tendency to engage in emotional eating will be positively associated with cravings and consumption.

In order to evaluate this hypothesis, Pearson correlations were calculated between the EI-Emotional Eating subscale and measures of trait -and state-based cravings and self-reported consumption. A significant correlation was found between the EI-Emotional Eating subscale and trait-based cravings (FCQ-T), and the relationship was in the predicted direction and moderate in strength. In contrast, correlations between the EI-Emotional Eating subscale and measures of state-based cravings and self-reported consumption, while in the predicted direction, were small in size ( $r$  ranged from .04 to .18) and were not significant (see Table 15). A logistic regression performed to assess the impact of the EI-Emotional Eating subscale on the likelihood that participants would consume from the candy container revealed a negative (though non-significant) B value, which suggests that greater emotional eating scores were associated with a decreased probability of consuming from the candy container (see Table 16).

### 3.6. Primary Hypotheses

**Primary Hypothesis 1:** Given the decision to exclude NIG from the first series of analyses, the original first hypothesis (predicting greater effectiveness for the active interventions) was moot. Instead, the analysis compares the effectiveness of ABG and CBG, but with no specific hypothesis about which would be more effective.

Independent samples t-tests revealed a pattern of less sweet cravings in the acceptance-based group as compared to the cognitive-based group. As seen in Table 17 and Figure 1, the results revealed a moderate effect of group on FCQ-S, and a small effect of group on craving frequency and distress. No difference was found between the two groups in terms of self-reported sweet consumption.

Consumption was also evaluated using a chi-square test to determine whether there was a difference between groups in candy container consumption (contrast-coded: abstinent vs. non-abstinent). As seen in Figure 2, 23.1% ( $n = 6$ ) of participants in the CBG and 9.1% ( $n = 2$ ) of participants in the ABG were non-abstinent from the candy container. This finding was consistent with the overall pattern of greater effectiveness for the ABG, but the effect did not reach significance ( $\chi^2_{(1)} = 1.68, p = .20, \phi = -.19$ ).

**Primary Hypothesis 2:** Initial susceptibility to the presence and availability of food will moderate the relationship between intervention group and outcome variables such that greater susceptibility to the food environment will be associated with better outcome for those in the acceptance-based coping strategy group while less susceptibility to the food environment will be associated with better outcome for those in the standard cognitive-based coping strategy group.

This hypothesis was examined using analyses of variance (ANOVAs) conducted with group (2 levels; CBG and ABG) and PFS (3 levels; low, moderate, and high) as independent variables. Dependent variables were FCQ-S, craving frequency, craving distress, and self-reported consumption. Partial eta squared ( $\eta_p^2$ ) was used to estimate the degree of association. The moderation effect was represented by the group by PFS interaction. The ANOVAs for the group by PFS interaction on measures of craving and self-reported consumption revealed small effects ( $\eta_p^2$  ranged from .01 to .04; see Table 18 and Figures 3-6). Across the dependent variables, the results reveal a pattern wherein ABG appears to be more effective at low and high levels of PFS while CBG appears to be equivalent or more effective at moderate levels of PFS.

In order to examine the interaction effect of group by PFS on candy container consumption, a logistic regression was conducted, with group (contrast-coded) and PFS (continuous) entered as independent variables, and abstinence versus non-abstinence as the dependent variable. The group by PFS interaction was small and non-significant (Odds Ratio = .98,  $B = -.02$ , Wald = .11,  $p = .74$ ).

The group by PFS interaction effect was examined post-hoc using the three subfactors of the PFS: Food Available, Food Present, and Food Tasted. While small effects were found for the interaction effects with both the Food Available and Food Tasted factors, moderate to large effects were found for the Group by Food Present interaction on FCQ-S, craving distress, and self-reported consumption. A consistent pattern was found wherein ABG appeared to offer an advantage at high levels of PFS (see Table 19 and Figures 7-9). Logistic regressions examining the group by PFS subfactor interaction effects on candy container consumption were non-significant.

**Hypothesis 3:** Tendency to eat in response to negative emotions will moderate the relationship between the coping strategy groups and outcome variables such that greater levels of emotional eating will be associated with better outcome for those in the acceptance-based coping strategy group while lower levels of emotional eating will be associated with better outcome for those in the standard cognitive-based coping strategy group.

In order to examine the effects of emotional eating on the relationship between group and outcome variables, analyses of variance (ANOVAs) were conducted with group (2 levels: CBG and ABG) and EI-Emotional Eating (3 levels; low, moderate, and high) as independent variables and FCQ-S, craving frequency, craving distress, and self-reported consumption as dependent variables. The group by EI-Emotional Eating interaction was examined. As seen in Table 20 and Figure 10, a moderate group by EI-Emotional Eating effect on FCQ-S was found, and the pattern suggests that CBG participants reported fewer cravings at low levels of emotional eating but more cravings at moderate to high levels of emotional eating. A similar pattern, though small and non-significant, was found for craving frequency and distress except that ABG also reported fewer or comparable cravings at low levels of emotional eating. The group by EI-Emotional Eating effect on self-reported sweet consumption was large in size ( $\eta_p^2 = .11$ ) and was significant using a less stringent criterion ( $p = .09$ ). As shown in Figure 11, the pattern suggests that among those participants who reported low levels of emotional eating, the CBG evidenced less consumption, while among those participants who reported high levels of emotional eating, the ABG evidenced less consumption. At moderate levels of emotional eating, there was no apparent difference between groups.

In order to determine whether there was an interaction effect of group by EI-Emotional Eating on the likelihood that participants would consume from the candy container, a logistic regression was conducted with group (contrast coded) and EI-Emotional Eating (continuous) as independent variables and abstinence vs. non-abstinence from the candy container as the dependent variable. As seen in Figure 12, the group by EI-Emotional Eating interaction on candy container consumption (Odds Ratio = 18.26,  $B = 2.91$ , Wald = 1.30,  $p = .26$ ), while non-significant, shows a consistent pattern wherein for those in the middle and highest bands of emotional eating, the CBG demonstrated greater consumption rates (8.3% in the middle band and 2.1% in the highest band as compared to 0% in each band for the ABG), while for those in the lowest band, ABG demonstrated a greater consumption rate (4.2% as compared to 2.1% in CBG).

### 3.7. Exploratory Hypotheses

***Exploratory Hypothesis 1:*** The acceptance-based coping strategy group will consume less food during a test of the “rebound effect” as compared to the standard cognitive-based coping strategy group.

Only participants who reported that they fasted for the two hours prior to the taste test were included in the analysis. In the CBG, one participant reported that she did not fast, and in the ABG, one did not respond to the fasting question and one reported that she did not fast. One additional participant in the ABG did not complete the taste test. Thus, a total of 25 CBG participants and 19 ABG participants were included in this analysis. Prior to beginning the taste test, participants were asked to complete ratings of hunger level. Group differences in hunger ratings evaluated with independent samples t-

tests were small in size (see Table 21). In order to assess the “rebound effect,” an independent samples t-test was conducted with group as the independent variable and consumption during the “rebound test” (as measured by the change in the weight of the candy bowls from pre- to post-taste test) as the dependent variable. As seen in Figure 13, the results revealed a small difference between groups ( $t_{(42)} = .78, p = .44, d = .24$ ) with participants in the CBG ( $M = 48.44, SD = 48.10$ ) consuming more sweets during the taste test than those in the ABG ( $M = 38.42, SD = 33.21$ ).

***Exploratory Hypothesis 2:*** Among those who are highly restrained, CBG will be more effective for those who are currently dieting whereas ABG will be more effective for those who are not currently dieting.

Highly restrained eaters were identified as those scoring in the top one-third of the EI-Cognitive Restraint subscale. Analyses of variance (ANOVAs) were conducted with group (2 levels: CBG and ABG) and dieting status (2 levels: dieting or not dieting) as independent variables. Dependent variables were FCQ-S, craving frequency, craving distress, and self-reported consumptions of sweets. For this analysis, participants who indicated that they were “sort of” dieting, “semi-dieting”, “on and off” dieting, or “watching” what they ate were included as not currently dieting. A total of 14 participants were included in the analyses (CBG = 9, ABG = 5; Dieting = 5; Not Dieting = 9). The hypothesized interaction was not found to predict cravings or consumption (see Table 22).

In order to determine whether there was an interaction effect of group by dieting status on the likelihood that highly restrained participants would consume from the candy container, a logistic regression with conducted with group (contrast-coded) and current

dieting status (contrast-coded) as independent variables and abstinence vs. non-abstinence from the candy container as the dependent variable. The predicted group by dieting status interaction effect on candy container consumption was also not supported. Results of the logistic regression and percentages per category are recorded in Tables 23 and 24, respectively.

### 3.8. Summary of Results Including No Intervention Group

The overall pattern of results when the NIG was included suggests that NIG was associated with greater and more distressing cravings than the two active coping strategy groups but that, surprisingly, they demonstrated less sweet consumption. As seen in Table 25, the results indicated a large effect of group on FCQ-S ( $F_{(2, 65)} = 4.00, p = .02, \eta_p^2 = .11$ ) and moderate effects of group on craving frequency ( $F_{(2, 65)} = 1.86, p = .16, \eta_p^2 = .05$ ) and distress ( $F_{(2, 65)} = 1.63, p = .20, \eta_p^2 = .05$ , respectively). As predicted, evaluation of pairwise comparisons suggests a pattern wherein the active coping strategy groups were associated with fewer and less distressing cravings than the NIG. Unexpectedly, participants in the NIG reported consuming the least amount of sweet food and drink, although the difference among groups was small in size ( $F_{(2, 65)} = .53, p = .59, \eta_p^2 = .02$ ). Moreover, results of the logistic regressions revealed that those in the NIG were also less likely to consume from the candy container as compared to the CBG and the ABG. As seen in Table 26, those in the CBG were over eleven times more likely to consume from the candy container than those in the NIG (Odds Ratio = 11.43,  $B = 2.44$ , Wald = 3.50,  $p = .06$ ), and those in the ABG were three times more likely to consume from the candy container than those in the NIG (Odds Ratio = 3.11,  $B = 1.13$ , Wald = .71,  $p = .40$ ). Finally, a moderate effect (trend) of group on taste test consumption was



found ( $F_{(2,58)} = 1.15$ ,  $p = .33$ ,  $\eta_p^2 = .04$ ) wherein the CBG consumed the most sweets during the taste test while the ABG and the NIG consumed the least. The difference between the NIG and the CBG was moderate in size ( $d = .41$ ), while the difference between the NIG and the ABG was small in size ( $d = .13$ ).

#### 4. DISCUSSION

The current study is a follow-up to our original craving study (Forman, Hoffman et al., 2007), and it aimed to provide a stronger test of traditional cognitive-based and acceptance-based coping strategies for sweet cravings. In order to create a situation more similar to real-world dieting, female participants who were overweight or obese and who reported frequent sweet cravings and consumption were asked to restrict consumption of all sweets for a period of three days. During this time, they were asked to carry a transparent container of candies with them and to complete ratings of sweet cravings and consumption. At the end of the 72-hour restriction period, they returned the candy container and ratings. At this time, they also completed a taste test of three different candies, which was designed to surreptitiously assess whether or not they subsequently increased consumption of a previously restricted food (i.e., “rebound effect”).

The primary purpose of this study was to evaluate which coping strategy group was most effective for helping overweight and obese women manage sweet cravings and consumption as well as to examine whether the relationship between group and outcome depended on initial susceptibility of the food environment and/or tendency to engage in emotional eating. This study also tested two exploratory hypotheses which aimed to test whether there were group differences in the “rebound effect” and whether there were group differences in sweet cravings and consumption between high restraint dieters and

high restraint non-dieters. Given that this study was underpowered, effect size and the overall pattern were emphasized.

#### **4.1. Relationship Between Cravings and Consumption**

As hypothesized, sweet cravings were positively associated with consumption of sweets. This finding is consistent with results of the original craving study (Forman, Hoffman et al., 2007) and with the theory that cravings are implicated in dietary non-adherence and thus contribute to problems with weight control (Basdevant et al., 1995). Existing weight loss interventions, such as the LEARN program (Brownell, 2000) and the Diabetes Prevention Program (The Diabetes Prevention Program Research Group, 1999), do not explicitly target food cravings. Given the association between sweet cravings and consumption, the success of weight management programs may be improved by incorporating interventions that directly target food cravings.

#### **4.2. Susceptibility to the Food Environment and Emotional Eating as Predictors of Craving and Consumption**

Previous research has suggested that food cravings arise in response to environmental cues (e.g., Cornell et al., 1989) and in response to negative emotional states (e.g., Hill et al., 1991). Accordingly, we predicted susceptibility to the presence of food (as measured with the PFS) and tendency to engage in emotional eating (as measured with the EI-Emotional Eating subscale of the EI) would be positively associated with cravings and consumption. As hypothesized, greater scores on the PFS and EI-Emotional Eating scale were associated with greater cravings, and this relationship was most apparent with the measure of trait-based cravings.

The prediction that the PFS and EI-Emotional Eating scale would be positively associated with sweet consumption was partially supported. A positive, though small, association was found between self-reported sweet consumption and both PFS and EI-Emotional Eating. The opposite pattern was found with consumption from the candy containers. Specifically, the PFS and EI-Emotional Eating scale were both found to be associated with *decreased* tendency to consume from the candy container. A possible explanation for this finding may be that the coping strategy interventions and/or the externally-imposed instruction to not consume sweets influenced consumption (as was intended) and thus may have influenced the relationship between consumption and PFS and EI-Emotional Eating. Given that it is likely that the interventions impacted this relationship, it is perhaps more meaningful to examine the interaction effect of group and both PFS and EI-Emotional Eating on consumption, as is discussed below.

#### **4.3. Effectiveness of Standard Cognitive-based and Acceptance-based Coping Strategies**

While we did not predict that one coping strategy group would be more effective than the other, the overall pattern suggests a tendency towards less sweet cravings in the ABG as compared to the CBG, although the effect sizes were small to moderate in size. Similarly, while no difference was found in terms of self-reported sweet consumption, comparison of consumption from the candy containers revealed that CBG participants were more likely to consume from the candy container than ABG participants. Previous research has suggested that overweight and obese women may experience greater difficulty coping with and resisting their cravings (e.g., Bjorvell et al., 1985). The overall main effect of the acceptance-based approach for helping overweight and obese women

cope with, and resist acting on, their sweet cravings is consistent with the theory that an acceptance-based approach is most beneficial when used in response to unwanted internal experiences that the individual struggles to control or eliminate. Thus, it may be that acceptance-based strategies offer some advantage over traditional cognitive-based strategies for overweight women wanting help coping with sweet cravings.

When the NIG was included in the analyses, the results revealed that while NIG participants reported greater cravings than both active interventions, they reported the least self-reported sweet consumption and were the least likely to consume from the candy box. We believe that the time study personnel spent with NIG participants was too short to assume that they would fully understand the study requirements and be invested in the study. Accordingly, we suspect that NIG participants may have unknowingly consumed sweets, and thus underreported their sweet consumption. Conversely, if the NIG were compliant with study instructions, their lower consumption rates may suggest that the active interventions groups were iatrogenic. It is possible that the active interventions may have created anticipatory anxiety and additional thoughts about cravings and urges for sweets that resulted in a greater likelihood that they would consume sweets despite receiving coping strategies. Anecdotally, participants in the active groups expressed doubt in their ability to be successful in resisting sweets for the duration of the restriction period. In order to help participants feel more confident in their ability to use the coping strategies to resist acting on cravings occurring in their everyday lives, it may be necessary to use a multi-session design that allows for participants to practice using the strategies outside of the group session and to then to process their experiences within subsequent sessions.

Both coping strategy groups were associated with positive ratings on measures of treatment acceptability with the differences between the two groups being non-significant and mostly small in size. The one exception was that CBG participants reported having an easier time implementing the respective strategies relative to ABG and this difference, while non-significant, was associated with a moderate effect size. One possible reason for this difference in ease of implementation may be that the acceptance-based strategies differed more from participants' usual ways of responding to cravings than the cognitive-based strategies, and thus, were more difficult to use. A single-session workshop may be too short to adequately teach acceptance-based strategies. In order to increase the ease at which participants can implement acceptance-based strategies, a multi-session design that allows for additional discussion and application is likely warranted. The finding that the acceptance-based approach appears to offer an advantage despite participants in this group reporting more difficulty using the strategies suggests that using a more extended intervention may further enhance its effectiveness.

#### **4.4. Moderating Effects of Susceptibility to the Food Environment and Emotional Eating**

We also hypothesized that participants' susceptibility to the food environment and emotional eating would impact the relationship between group and outcome such that individuals who were more susceptible to the food environment and emotional eating would be better helped by the ABG while those who were less susceptible to the food environment and emotional eating would be better helped by the CBG. While our results did not support the strong group by PFS interaction effect evidenced in the original craving study (Forman, Hoffman et al., 2007), a consistent pattern was found wherein the

ABG appeared to offer an advantage over the CBG at high levels of susceptibility to the food environment. It may be that our sample of overweight and obese women had greater susceptibility to the food environment as compared to normal weight individuals, and thus there was less variability in our sample. Accordingly, a larger sample size may be necessary in order to detect an effect.

Consistent with our predictions, we found that acceptance-based strategies appeared to be especially advantageous at high levels of susceptibility to emotional eating while traditional cognitive-based strategies were found to be more advantageous at low levels of emotional eating. This finding suggests that acceptance-based strategies may be most beneficial among those individuals who have the greatest difficulty coping with and managing their eating behaviors in response to emotional experiences. In contrast, standard cognitive-based interventions may be more effective, though perhaps less necessary, among participants who have less of a tendency to eat in response to their emotional experiences. The results are consistent with previous research (e.g., Forman, Hoffman et al., 2007) and provide additional support for the theory that acceptance-based strategies may be most helpful for those individuals who have the most difficulty coping with unpleasant internal experiences and who engage in undesirable behaviors in order to reduce or eliminate them. Traditional cognitive-based strategies that emphasize controlling or changing one's internal experiences may actually be ineffective or iatrogenic for these individuals.

#### **4.5. "Rebound Effect"**

Existing research suggests that overweight and obese individuals may be susceptible to overeating following a period of dieting (Lowe et al., 2001; Wardle &

Beales, 1988). Accordingly, an additional objective of this study was to examine whether participants subsequently increased consumption of sweets following the lifting of the externally-imposed instruction to restrict consumption of sweets, which is referred to as the “rebound effect.” Participants were asked to participate in a post-restriction period taste test designed to measure consumption of sweets without their knowledge.

Consistent with the overall pattern of results, participants in the CBG consumed more sweets during the taste test than those in the ABG. This finding provides preliminary support for the use of acceptance-based strategies in helping overweight and obese women resist the tendency to engage in “rebound” eating, which likely contributes to the difficulty individuals have maintaining successful weight loss.

#### **4.6. Highly Restrained Dieters Versus Non-Dieters**

The nature of the relationships between dietary restraint, current dieting, and food cravings is unclear. Initial studies of dietary restraint found that highly restrained eaters tend to engage in counter-regulatory eating in response to high calorie pre-loads and emotional stimuli (e.g., Heatherton et al., 1990; Ruderman, 1986). However, later studies found that the relationship between dietary restraint and counter-regulatory eating is moderated by current dieting status such that individuals who are highly restrained and currently dieting tend not to engage in counter-regulatory eating, and in fact decrease their eating following a preload (Lowe, 1994; Lowe et al., 1991). In contrast, those who are highly restrained and not currently dieting are more likely to engage in counter-regulatory eating (Lowe, 1994; Lowe et al., 1991). Accordingly, we predicted that acceptance-based coping strategies may be more beneficial among high restraint non-dieters, who presumably have a more difficult time coping with their sweet cravings.

Standard cognitive-based strategies, on the other hand, may be more beneficial among high restraint current dieters, who presumably have a less difficult time managing their sweet cravings. Our results did not support this hypothesized interaction. The absence of an effect may suggest that whether one identifies as currently dieting does not impact the relationship between group and outcome among high restraint eaters. Alternatively, it may be that an effect does exist but that we were unable to detect it because we were underpowered. Our ability to test this predication was limited by the small number of participants who were identified as high restraint eaters. Another possible explanation for the null finding may be related to measurement error. Specifically, our assessment of current dieters may not have been reliable. “Dieters” were identified based on participants’ responses to the question “Are you currently dieting?” Presumably, participants who responded that they were currently dieting could have differed greatly in the types of eating behaviors they were engaging in to reduce their intake and in how successful they were. It is also possible that their eating behaviors may have differed little from those who identified as not currently dieting. A more reliable indicator of current dieting status may be necessary. For example, participants could be asked to specify what particular behaviors they are engaging in to reduce their caloric intake and to indicate how successful they believe they are in carrying out these behaviors.

#### **4.7. Limitations**

There were a number of limitations in the design of this study. First, we did not have sufficient statistical power given the small sample size. Second, the analog design limits our ability to make generalizations to real-world dieting or to bona fide weight loss interventions. Third, we did not have baseline measure of our primary dependent



variables, and so we cannot confidently rule out the alternative hypothesis that group differences may be due to pre-existing differences. Fourth, we relied heavily on self-report data, which is often unreliable. Fifth, we did not collect data on whether or not participants were perimenstrual, which previous research has found to be associated with increased sweet cravings (e.g., Rozin, Levine, & Stoess, 1991). However, the original craving study (Forman, Hoffman et al., 2007), which did collect menstrual cycle data, did not find that menstrual status influenced outcome. Sixth, the problems with the control group resulted in the decision to de-emphasize their data, and thus we cannot confidently rule-out threats to internal validity. (Alternatively, if the NIG was indeed compliant with study requirements, the finding that the NIG was associated with lower consumption rates raises the possibility that the active interventions may have had the paradoxical effect of increasing consumption of the restricted foods.) Finally, the absence of a long-term follow-up assessment in the study design does not allow us to draw conclusions about whether or not the strategies can be maintained after a longer duration of time has passed.

#### **4.8. Strengths**

Despite its limitations, the current study makes important contributions to the existing body of literature on food cravings. While food cravings are a common occurrence (e.g., Weingarten & Elston, 1991) and have been shown to be connected with unwanted eating behaviors (e.g., Bjorvell et al., 1985), the research on strategies for managing food cravings is limited. Forman et al. (2007) was the first study to examine the relative effectiveness of cognitive-based and acceptance-based coping strategies for food cravings. They found that acceptance-based strategies were superior to standard

cognitive-based strategies in individuals who were highly susceptible to the food environment. The current study expanded on Forman et al. (2007) by using a sample of overweight and obese females who reported frequent sweet cravings and consumption, and thus for whom learning to cope with and resist acting on their cravings may be most beneficial. Moreover, the coping strategies were put to a stronger test by including a broader class of dietary restrictions (i.e., the majority of sweets), extending the abstinence period, and requiring participants to carry a container of mixed candy for the duration of the study to provide an intensified parallel to the experience of “dieting” in an environment in which highly desired but prohibited food is ubiquitous. Under these more challenging conditions, the acceptance-based coping strategies appear to offer a greater advantage over traditional cognitive-based coping strategies, and this advantage is most clearly evident among those who are highly susceptible to eating in response to emotional experiences.

#### **4.9. Implications**

While both coping strategies appear to help overweight and obese women cope with sweet cravings, the overall pattern of results suggests that acceptance-based coping strategies may be especially beneficial. They were found to be particularly helpful among those participants who reported the greatest difficulty resisting cravings and urges to eat that arise in response to emotional experiences. Moreover, the acceptance-based strategies were found to be more effective in helping decrease susceptibility to the “rebound effect,” which has been implicated in unsuccessful weight maintenance. Taken together, these results suggest that acceptance-based strategies for sweet cravings may be

an important addition to interventions aiming to promote weight loss and weight loss maintenance.

#### **4.10. Future Study Designs**

In order to have greater confidence in our findings, future research should be conducted with a sufficient number of participants to have adequate statistical power. The inclusion of baseline measures of outcome variables would allow for alternative hypotheses regarding pre-existing differences to be ruled-out with greater confidence. The use of more reliable methods for ecological momentary assessment would allow for greater reliability in the data. (For example, the use of palm pilots may provide greater confidence that participants are recording their responses at the desired times.) Additionally, the use of higher level statistical procedures (such as hierarchical linear modeling) would allow for comparisons across a number of time points. In order to avoid the floor effect that was found in both this and the original craving study, participants could be told to try their best not to consume sweets during the restriction period and to use the coping strategies they received to respond to cravings (the latter instruction would be excluded for those in the NIG), but that if they do decide to consume sweets they should do so from the provided sweets container. The finding that the majority of participants self-reported consuming sweets (although the majority did not consume from the candy container) suggests that there may be greater variability in candy container consumption if the instructions were changed in this way. In order to prevent non-compliance on the part of the control group, it would be important to increase the quality and quantity of interactions between study personnel and the control group's members (such as by providing a psycho-educational intervention). Finally, the

inclusion of a long-term follow-up assessment would provide information on whether the strategies can be maintained over the long-term.

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## **APPENDIX A: LIST OF RESTRICTED SWEETS**

### **Restricted Sweets**

During the study period we ask that you do your best not to eat sweets. Below we have listed foods that are included in the category of “sweets” and so should be avoided.

Please note that sugar substitutes should also be avoided.

- Chocolate and chocolate-containing foods
- Cakes, cupcakes, and other cake-like foods
- Pastries
- Ice cream
- Candy (e.g., lollipops, gummy bears, hard candies)
- Soda (including diet)
- Cookies
- Chewing gum
- Sugar substitutes and food containing sugar substitutes (e.g., Equal®, Splenda®, Sweet & Low®)

## APPENDIX B: COPIES OF MEASURES

### SCREENING QUESTIONNAIRE

Study ID#: \_\_\_\_\_

How did you hear about the study? (circle one)  
(Flyer / Website /Email/Voicemail message / Other\_\_\_\_\_)

Date of Birth: \_\_\_\_\_

Age: \_\_\_\_\_ (*Must be over 18 and under 60*)

Gender: (1) ☐ Female (2) ☐ Male (*Must be female to participate*)

Height: \_\_\_\_\_ft. \_\_\_\_\_ in.

Weight: \_\_\_\_\_lbs.

[*Calculate BMI using chart on wall: \_\_\_\_\_ Must be 25 or over to participate*]

Do you currently have or have you had eating disorder in the past ten years?

(1) ☐ Yes (2) ☐ No If yes, which one: \_\_\_\_\_

Are you currently lactating or pregnant? (1) ☐ Yes (2) ☐ No (*if yes, not eligible*)

Are you currently diabetic or have a history of diabetes? (1) ☐ Yes (2) ☐ No (*if yes, not eligible*)

Do you like chocolate? (1) ☐ Yes (2) ☐ No (*if no, not eligible*)

Are you able to eat chocolate? (1) ☐ Yes (2) ☐ No (*if no, not eligible*)

If no, please briefly tell us why: \_\_\_\_\_

Are you able to eat nuts? (1) ☐ Yes (2) ☐ No (*if no, not eligible*)

If no, please briefly tell us why: \_\_\_\_\_

As part of this project, the research team will send you messages 4 times throughout each day...

Would you be able to receive all 4 messages within 15 minutes if sent via text message to your cell phone? (1) ☐ Yes (2) ☐ No

Would you be able to receive all 4 messages within 15 minutes left on the voicemail of your cell phone? (1) ☐ Yes (2) ☐ No

Would you be able to receive all 4 messages within 15 minutes if sent to you by email? (1) ☐ Yes (2) ☐ No

Have you participated in a formal weight loss program (e.g., Weight Watchers®, Jenny Craig®, university-based) in the past 3 months or are you currently participating in a formal weight loss program? (1) ☐ Yes (2) ☐ No *(if yes, not eligible)*

Are you currently taking medications for weight loss or medications that affect your weight or appetite? (1) ☐ Yes (2) ☐ No *(if yes, not eligible)*

If yes, what meds are you on \_\_\_\_\_

If they don't know, what meds are you on \_\_\_\_\_

Are you currently dieting? (1) ☐ Yes (2) ☐ No

If yes, for what purpose?

(1) ☐ Lose weight

(2) ☐ Maintain weight/Avoid weight gain

1. Do you experience strong urges to consume savory foods, which are foods that are very tasty, like salty foods. Examples include potato chips, pizza, French fries. Please note that this would not include sweet foods. Also, make sure you are thinking about on average, outside of the time that you begin menstruating and the one or two days before and after.

1	2	3	4	5
Not at all	A little	A moderate amount	A great deal	Intensely

2. How often do you generally crave savory foods (on average, outside of the time that you begin menstruating and the one or two days before and after)?

1	2	3	4	5
Not at all	A little	A moderate amount	A great deal	Intensely

3. How often do you generally eat savory foods (on average, outside of the time that you begin menstruating and the one or two days before and after)?

1	2	3	4	5
Rarely or never	Once a week	A few times a week	Once a day	A few times a day

4. How difficult do you think it would be to go without savory foods for 72 hours?

1	2	3	4	5
Very easy	Easy	A little difficult	Difficult	Extremely difficult

5. Do you experience strong urges to consume sweet foods (on average, outside of the time that you begin menstruating and the one or two days before and after)?

1	2	3	4	5
Not at all	A little	A moderate amount	A great deal	Intensely

6. How often do you generally crave sweets (on average, outside of the time that you begin menstruating and the one or two days before and after)?

1	2	3	4	5
Not at all	A little	A moderate amount	A great deal	Intensely

7. How often do you generally eat sweets (on average, outside of the time that you begin menstruating and the one or two days before and after)?

1	2	3	4	5
Rarely or never	Once a week	A few times a week	Once a day	A few times a day

8. How difficult do you think it would be to go without sweets for 72 hours?

1	2	3	4	5
Very easy	Easy	A little difficult	Difficult	Extremely difficult

**Is this participant eligible?** (1) ☐ Yes (2) ☐ No (3) ☐ Unsure (*need to check*)

**If YES...ask about availability...**

Are you available XX from XX to XX?

(circle one) Yes No Maybe

If not, how about from XX– XX?

Yes No Maybe

Are you available XX from XX to XX?

(circle one) Yes No Maybe

If not, how about from XX– XX?

Yes No Maybe

Are you available XX from XX to XX?

(circle one) Yes No Maybe

If not, how about from XX– XX?

Yes No Maybe

Are you available XX from XX to XX?

(circle one) Yes No Maybe

If not, how about from XX - XX?

Yes No Maybe

For the dates that you indicated you were available, would you be able to come back three days later for the 15 minute final assessment? Yes No Maybe

(Notes: \_\_\_\_\_  
\_\_\_\_\_)

**If NOT Eligible...why?**

Can we keep you name and number on file in case we have other research studies?

(circle one) (1) ☐ Yes (2) ☐ No

# DEMOGRAPHIC QUESTIONNAIRE

## Employment status:

- (0) ☐ full-time      (1) ☐ part-time      (2) ☐ occasional      (3) ☐ disability/SSI  
 (4) ☐ no income

## Student status

- (0) ☐ full-time      (1) ☐ part-time

## Student type

- (0) ☐ undergraduate      (1) ☐ graduate

## Marital/relationship status:

- (0) ☐ single (no current romantic partner)      (1) ☐ divorced      (2) ☐ widowed  
 (3) ☐ living with partner/married      (4) ☐ not living with current partner

## Ethnicity (*check all that apply*):

- (0) ☐ African American / Black  
 (1) ☐ Caribbean / Haitian  
 (2) ☐ African  
 (3) ☐ Asian American  
 (4) ☐ Asian / Pacific-Islander  
 (5) ☐ White / European American / Caucasian  
 (6) ☐ European  
 (7) ☐ Latino/Latina / Hispanic American / Hispanic  
 (8) ☐ Native American / American Indian  
 (9) ☐ Multiracial  
 (10) ☐ Other:

## Is English your first language?

- (0) ☐ No; I learned starting at age: \_\_\_\_\_  
 (1) ☐ Yes

## Were you born in the U.S.?

- (0) ☐ No; I was born in: \_\_\_\_\_  
 (1) ☐ Yes

### Food Craving Questionnaire-Trait Version

Below is a list of comments made by people about their eating habits. In the space to the left, please write the letter indicating how frequently these comments would be true for you in general. Please respond to each item as honestly as possible.

Never or Rarely	Sometimes	Often	Usually	Always	Not applicable
(1)	(2)	(3)	(4)	(5)	(6)

- \_\_\_\_ 1. Being with someone who is eating often makes me hungry.
- \_\_\_\_ 2. When I crave something, I know I won't be able to stop eating once I start.
- \_\_\_\_ 3. If I eat what I am craving, I often lose control and eat too much.
- \_\_\_\_ 4. If I get what I am craving I cannot stop myself from eating it.
- \_\_\_\_ 5. I have no will power to resist my food cravings.
- \_\_\_\_ 6. Once I start eating, I have trouble stopping.
- \_\_\_\_ 7. If I give in to a food craving, all control is lost.
- \_\_\_\_ 8. Whenever I go to a buffet I end up eating more than what I needed.
- \_\_\_\_ 9. It is hard for me to resist the temptation to eat appetizing foods that are in my reach.
- \_\_\_\_ 10. When I am with someone who is overeating, I usually overeat too.



### Power of Food Scale

Please indicate the extent to which you agree that the following items describe you. Use the following scale from 1–5 for your responses.

		I don't agree (1)	I agree a little (2)	I agree somewhat (3)	I agree quite a bit (4)	I strongly agree (5)
1.	I find myself thinking about food even when I'm not physically hungry.	(1)	(2)	(3)	(4)	(5)
2..	I get more pleasure from eating than I do from almost anything else.	(1)	(2)	(3)	(4)	(5)
3.	If I see or smell a food I like, I get a powerful urge to have some.	(1)	(2)	(3)	(4)	(5)
4.	When I'm around a fattening food I love, it's hard to stop myself from at least tasting it.	(1)	(2)	(3)	(4)	(5)
5.	It's scary to think of the power that food has over me.	(1)	(2)	(3)	(4)	(5)
6.	When I know a delicious food is available, I can't help myself from thinking about having some.	(1)	(2)	(3)	(4)	(5)
7.	I love the taste of certain foods so much that I can't avoid eating them even if they're bad for me.	(1)	(2)	(3)	(4)	(5)
8.	Just before I taste a favorite food, I feel intense anticipation.	(1)	(2)	(3)	(4)	(5)
9.	When I eat delicious food I focus a lot on how good it tastes.	(1)	(2)	(3)	(4)	(5)
10.	Sometimes, when I'm doing everyday activities, I get an urge to eat "out of the blue" (for no apparent reason).	(1)	(2)	(3)	(4)	(5)
11.	I think I enjoy eating a lot more than most other people.	(1)	(2)	(3)	(4)	(5)
12.	Hearing someone describe a great meal makes me really want to have something to eat.	(1)	(2)	(3)	(4)	(5)
13.	It seems like I have food on my mind a lot.	(1)	(2)	(3)	(4)	(5)
14.	It's very important to me that the foods I eat are as delicious as possible.	(1)	(2)	(3)	(4)	(5)
15.	Before I eat a favorite food my mouth tends to flood with saliva.	(1)	(2)	(3)	(4)	(5)

**The Three-Factor Eating Questionnaire – Revised 21-Item**

1. I deliberately take small helpings to control my weight.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
2. I start to eat when I feel anxious.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
3. Sometimes when I start eating, I just can't seem to stop.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
4. When I feel sad, I often eat too much  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
5. I don't eat some foods because they make me fat.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
6. Being with someone who is eating, often makes me want to also eat.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
7. When I feel tense or "wound up", I often feel I need to eat.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
8. I often get so hungry that my stomach feels like a bottomless pit.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
9. I'm always so hungry that it's hard for me to stop eating before finishing all of the food on my plate.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
10. When I feel lonely, I console myself by eating  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false
11. I consciously hold back on how much I eat at meals to keep from gaining weight.  
(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false

12. When I smell a sizzling steak or see a juicy piece of meat, I find it very difficult to keep from eating – even if I’ve just finished a meal.

(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false

13. I’m always hungry enough to eat at any time

(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false

14. If I feel nervous, I try to calm down by eating.

(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false

15. When I see something that looks very delicious, I often get so hungry that I have to eat right away.

(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false

16. When I feel depressed, I want to eat.

(1) Definitely true, (2) Mostly true, (3) Mostly false, (4) Definitely false

17. How often do you avoid “stocking up” on tempting foods?

(1) Almost never, (2) Seldom, (3) Usually, (4) Almost always

18. How likely are you to make an effort to eat less than you want?

(1) Unlikely, (2) A little likely, (3) Somewhat likely, (4) Very likely.

19. Do you go on eating binges even though you’re not hungry?

(1) Never, (2) Rarely, (3) Sometimes, (4) At least once a week

20. How often do you feel hungry?

(1) Only at mealtimes, (2) Sometimes between meals (3) Often between meals (4) Almost always

21. On a scale from 1 to 8, where 1 means no restraint in eating and 8 means total restraint, what number would you give yourself?

Mark the number that best applies to you: 1 2 3 4 5 6 7 8.\*

### Daily Craving Ratings

Day \_\_\_\_

To be filled out at 11am/ 4pm/ 8pm/Before Bed

Below is a list of comments made by people about their eating habits. In the space to the left, please write the letter indicating how much you agree with the comment right now, at this very moment. Please respond to each item as honestly as possible.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(1)	(2)	(3)	(4)	(5)

1. \_\_\_\_ I have an intense desire to eat sweets.
2. \_\_\_\_ I'm craving sweets.
3. \_\_\_\_ I have an urge for sweets.
4. \_\_\_\_ If I were to eat what I am craving, I am sure my mood would improve.
5. \_\_\_\_ If I ate something I wouldn't feel so sluggish and lethargic.
6. \_\_\_\_ Satisfying my craving would make me feel less grouchy and irritable.
7. \_\_\_\_ I would feel more alert if I could satisfy my craving.
8. \_\_\_\_ I know I'm going to keep on thinking about sweets until I actually have it.

Thinking about this morning/afternoon/evening...

9. Over the past few hours, how often did you crave sweets?
- |            |        |          |                  |              |
|------------|--------|----------|------------------|--------------|
| 1          | 2      | 3        | 4                | 5            |
| Not at all | Rarely | A little | Most of the time | Every moment |

10. If you had cravings for sweets, how distressing did you find them?

1	2	3	4	5
Not at all	A little	Moderately	Very	Extremely

11. How would you describe your mood at the time you experienced your most intense craving, over the past few hours (select the best response):

1	2	3	4	5	6
Angry	Sad/Depressed	Anxious/Stressed	Bored	Neutral	Happy

12. If your mood was unpleasant, to what extent did you think that eating sweets would make it better?

1	2	3	4	5
Not at all	A little	Moderately	Very	Extremely

13. How much sweet food did you eat?

1	2	3	4	5
None	About the amount of ½ Snickers® bar or less	An amount between ½ a Snickers® bar and a whole Snickers® bar (including 1 Snickers® bar)	An amount between 1 and 2 Snickers® bars (including 2 Snickers® bars)	More than the amount of 2 Snickers® bars

14. How much sweet drink did you have?

1	2	3	4	5
None	About the amount of half soda can	An amount between ½ a soda can and a whole soda can (including 1 soda can)	An amount between 1 and 2 soda cans (including 2 soda cans)	More than the amount of 2 soda cans

## Hunger Rating Sheet

1. Did you remember not to eat for the previous 2 hours? Yes No

**Because hunger may be related to taste preferences, please complete the following ratings:**

2. How hungry do you feel right now on a scale from 1 to 9, 1 being “not at all” and 9 being “as hungry as I ever felt”? (circle one)

1	2	3	4	5	6	7	8	9
							As hungry as I ever felt	

3. How strong is your desire to eat right now on a scale of 1 to 9, 1 being “very weak” and 9 being “very strong”? (circle one)

1	2	3	4	5	6	7	8	9
Very weak								Very strong

4. How much food do you think you could eat right now on a scale of 1 to 9, 1 being “nothing at all” and 9 being “a large amount”? (circle one)

1	2	3	4	5	6	7	8	9
Nothing at all								A large amount

5. How full does your stomach feel right now on a scale of 1 to 9, 1 being “not at all full” and 9 being “very full”? (circle one)

1	2	3	4	5	6	7	8	9
Not at all full								Very full

### END-OF-STUDY SURVEY

1. At those times when you had a craving/desire for sweets, to what extent did you try to do any of the following, and also to what extent did that help you cope with your cravings?

	Extent Attempted				Extent Successful		
	Not at all	A little	A lot		Not at all	A little	A lot
a. Thinking of something else	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Accept the craving as it is without trying to change it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Challenge negative thoughts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Evaluate pros and cons of eating sweets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Notice the craving, step back from it and see it as a normal internal experience	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Stay mindful of long-term values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Engage in another activity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Keep sweets out of my sight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Eat foods besides sweets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- j. In addition to those strategies listed above, what else did you do to help you cope with your cravings?

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2. Did you keep the bag of sweets with you at virtually all times?  
☐Yes   ☐No → How often were you without them? \_\_\_\_\_
3. Did you feel that you could eat sweets without the study personnel being aware?  
☐No   ☐Yes → How so? \_\_\_\_\_
4. Were you completely honest on your rating forms about whether you ate sweets?  
☐No   ☐Yes
5. Did you think that study personnel would know how much candy you ate during the taste test?   ☐No   ☐Yes

## **Treatment Acceptability Questionnaires**

### **(1) Treatment Expectations**

1. How often do you think you will use the coping strategies for sweet cravings over the next three days?

- (1) Never
- (2) Rarely
- (3) Sometimes
- (4) Often
- (5) Frequently

2. How helpful do you believe the coping strategies will be in helping you resist acting on your sweet cravings?

- (1) Not at all helpful
- (2) A little helpful
- (3) Somewhat helpful
- (4) Helpful
- (5) Very helpful

### **(2) End-of-Study Treatment Acceptability & Satisfaction**

Please answer these following questions that deal with your experiences and reactions to the study.

1. How effective were the coping strategies in helping you resist acting on your sweets cravings?

- (1) Not at all effective
- (2) A little effective
- (3) Somewhat effective
- (4) Effective
- (5) Very effective

2. How satisfied were you with the coping strategies we provided to help you resist acting on your sweets cravings?

- (1) Not at all satisfied
- (2) A little satisfied
- (3) Somewhat satisfied
- (4) Satisfied
- (5) Very satisfied



3. How helpful did you find the coping strategies for helping you resist acting on your sweets cravings?

- (1) Not at all helpful
- (2) A little helpful
- (3) Somewhat helpful
- (4) Helpful
- (5) Very helpful

4. How difficult they found the coping strategies to understand?

- (1) Very difficult
- (2) Difficult
- (3) Somewhat difficult
- (4) Somewhat easy
- (5) Easy
- (6) Very easy

5. How difficult did you find the coping strategies to implement?

- (1) Very difficult
- (2) Difficult
- (3) Somewhat difficult
- (4) Somewhat easy
- (5) Easy
- (6) Very easy

6. Over the next few months, how consistently do you think you will be able to use the strategies for responding to your sweets cravings?

- (1) Never
- (2) Rarely
- (3) Sometimes
- (4) Often
- (5) Always

7. Over the next few months, how consistently do you think you will be able to resist acting on your sweets cravings?

- (1) Never
- (2) Rarely
- (3) Sometimes
- (4) Often
- (5) Always

8. What coping strategies did you find most helpful or valuable?

9. What coping strategies did you find the least helpful or valuable?

## APPENDIX C: INTERVENTION MANUALS

	<p style="text-align: center;"><b>Standard Cognitive-Based Coping Strategy Group (CBG)</b>  [adapted from LEARN (Brownell, 2000), Diabetes Prevention Program (The Diabetes Prevention Program Research Group, 1999), and The Beck Diet Solution (Beck, 2007)]</p>
<i>time</i>	
0:05	1. Intro <ul style="list-style-type: none"> <li>○ Welcome</li> <li>○ Check of inclusion/exclusion criteria</li> </ul>
0:10	2. Informed Consent
0:20	3. Rationale <ul style="list-style-type: none"> <li>○ “The purpose of this study is to study cravings. Therefore, we are asking you to try not to eat any sweets for the next three days. At the same time, we are going to give you a small container of sweets to keep with you over the next three days. By carrying these sweets with you, it will ensure that your exposure to sweet food cues is consistent throughout the three day study period. Thus, it is very important for the purposes of the study that you have the sweets with you at all times, meaning at work, in class, at meals, at home, and so on. The three-day period will end at [time] which means the study will end at [time] on [day of week]. So again, during the three days try not to eat any of the sweets (e.g., candy bars, cookies, soda, cakes, ice cream, etc.)”<i>[Distribute boxes of sweets and list of restricted sweets]</i></li> </ul> 4. Measure instruction <ul style="list-style-type: none"> <li>○ “We are going to give each of you a packet to keep with you the next three days. <i>[Distribute packets]</i> In this packet, we ask that you complete ratings of cravings four times a day: 11 am, 4 pm, 8 pm, and before bed. In order to remind you to fill out these measures, we will be sending you text messages as this seems to be the quickest way to reach people. However, we know that not everyone uses text messaging or has a text messaging service and so on this sheet <i>[pass out reminder sheet]</i> we would like for you to indicate the best way for us to contact you so that we can remind you to complete these ratings. Of course, these are just to help you remember. We hope that you will do these ratings at the scheduled times regardless of whether or not you get the reminder. The ratings will only take you a couple of minutes to complete. It is very important that you complete the ratings at the specified time. In order to be able to do this, you need to keep the booklet with you at all times just as you are to keep the container of sweets.”</li> </ul>

	<ul style="list-style-type: none"> <li>○ “At this time, approximately 72 hours from now, meaning [<i>time</i>] [<i>day of week</i>] you will be asked to come back to return the container of sweets to [<i>collection location</i>], fill out a final, short questionnaire, complete a brief taste test, and receive your money for participating, which will be \$30. We ask that you do not eat for 2 hours prior to your scheduled appointment. We would like everyone to sign up for a 15 minute time slot. [Pass around final assessment sign-up sheet.]”</li> </ul> <p>5. Quick Instructions Review</p> <ul style="list-style-type: none"> <li>○ “During the 3-day period when you cannot eat sweets you may experience cravings to eat sweets. Remember, though, your task over the next 72 hours is not to eat any sweets.”</li> <li>○ <i>Give the following reminders:</i> <ul style="list-style-type: none"> <li>▪ Keep sweets with you wherever you go</li> <li>▪ Try not to eat any sweets</li> <li>▪ Fill out the craving ratings 4 times per day, i.e., 11am, 4pm, 8pm, and before bed. (Please note there are no 8pm or before bed ratings for the 3<sup>rd</sup> day.)</li> <li>▪ Bring measures and container of sweets at [<i>collection spot</i>] during the times of [<i>**:** to **:**. **</i>]. At that time, you will be asked to complete a final survey, a brief taste test, and you will also receive money for participating. Remember not to eat for two hours prior to your appointment.</li> </ul> </li> </ul> <p>6. Introduction to coping with cravings</p> <ul style="list-style-type: none"> <li>○ “So, over the next three days as you are trying not to eat any sweets, you may experience cravings and it may be hard to resist the urge to eat sweets. The idea behind this study is teach you a few strategies that psychologists have developed to help resist food cravings. We want you to make use of these strategies over the next three days whenever you have a desire to eat sweets. We want to measure how effective these strategies are. So again, the idea is that I am going to teach you some strategies to use whenever you get a craving to eat sweets. As I’m going through these strategies, make sure to ask me any questions you have about how to use them.”</li> <li>○ “To track how clear I am in explaining this to you, and whether you are able to remember what I am saying, I will pass out a short ‘quiz’ at the end that you fill out and give back to me.”</li> </ul>
0:25	<p>7. Questionnaire Packet</p> <ul style="list-style-type: none"> <li>○ Distribute questionnaire Packet</li> <li>○ Individual measurement of weight and height</li> </ul>
0:45	<p>8. Explanation of Cravings</p> <ul style="list-style-type: none"> <li>○ “Food cravings are strong urges to eat a particular food, often highly palatable foods like sweet foods. These foods also tend to be high in fat and calories.”</li> </ul>

	<ul style="list-style-type: none"> <li>○ “Food cravings are very normal experiences but can be problematic if they lead to too much snacking or binge eating. Since food cravings are often for very tasty and fatty foods, increased consumption of these foods can lead to undesired weight gain.”</li> </ul>
0:42	<p>9. Determinants of food cravings</p> <ul style="list-style-type: none"> <li>○ “Food cravings often occur in response to the food that is around you, like the sweets we are giving you. This is problematic given that our environment is characterized by the presence of high fat and high calorie foods that are typically very tasty. Given this, our environment has been referred to as an obesogenic environment. In this obesogenic environment, we may experience constant urges to eat the good-tasting, plentiful, available food around us.”</li> <li>○ “What makes this even more challenging is that we are hard-wired to want to eat energy dense foods, especially those that are highly tasty. We have a natural/evolved/adaptive inclination to be aware of, seek out and eat high energy foods.”</li> <li>○ “In addition, for some individuals, adverse internal experiences, such as feelings like boredom, sadness, stress, worry, can also lead us to experience unwanted food cravings. In this way, eating serves as a way to cope with negative emotions.”</li> <li>○ Some women report experiencing increases in food cravings prior to their menstrual cycle.”</li> </ul>
0:45	<p>10. Experience of food cravings [<i>Ask participants about their *experience* of having a food craving.</i>] “What does it feel like?” [<i>Ask them about previous experiences with going without sweets or other tasty foods.</i>] “What was that like? What were the challenges?”</p> <ul style="list-style-type: none"> <li>○ “When do you tend to experience food cravings? When you have a food craving, what do you usually do?”</li> <li>○ “Researchers have identified ways to help individuals manage and resist acting on their cravings. During today’s group, we will go over some strategies you can use when you notice that you are having cravings for sweets.</li> <li>○ [<i>Pass out worksheet</i>] “Here is a workshop packet which we will be using to do various exercises. There are also blank lines where you can take notes or jot down helpful reminders about the techniques we will be providing. These will be helpful to refer back to during the next few days should you experience cravings. ”</li> </ul>
0:55	<p>11. Distraction (<i>from LEARN</i>)</p> <ul style="list-style-type: none"> <li>○ “When you are having cravings your mind is likely to be focused on your desire to eat the sweet and on the sweet itself. But you don’t need to passively allow that to happen. You can take control of your mind using a number of simple strategies.”</li> <li>○ [<i>Solicit from participants any distraction strategies that they may already be using.</i>] “What sorts of strategies have you found useful to distract yourself from thoughts and feelings you didn’t want?”</li> <li>○ 1. Positive thinking</li> </ul>

	<ul style="list-style-type: none"> <li>▪ “Think about something wonderful. For instance plan a dream vacation or think of your favorite memory.”</li> <li>▪ “Let’s practice right now. For the next minute, I want you to think of something wonderful.”</li> <li>○ 2. Positive imagery <ul style="list-style-type: none"> <li>▪ “Another strategy is positive imagery. You visualize yourself somewhere other than where you are. Perhaps imagine that you are at your favorite spot in the world, maybe lying on a beach or sitting in a forest or standing on snowy mountain peak.”</li> <li>▪ “Can everyone close their eyes for just a moment? Good. Now try to visualize yourself in a place that you would love to be in. Imagine all the sensory details that you can: what it looks like, what it sounds like, what it smells like. Hold that image for a just a moment. ... I’ll let you know when to open your eyes... Okay, open your eyes... How did that go?”</li> </ul> </li> <li>○ 3. Mind games <ul style="list-style-type: none"> <li>▪ “You can also distract yourself from cravings by occupying your mind with a mind game of some sort. For instance, try to think about all of your teachers. Let’s try this now. Who can remember what his first grade teacher looked like? How about her name? Second grade teacher? Do you notice how your mind is focused on this task? You could go through all your teachers from kindergarten to 12<sup>th</sup> grade and it would be a great distraction exercise.”</li> </ul> </li> <li>○ 4. Activity Change <ul style="list-style-type: none"> <li>▪ “When you are having a craving, sometimes it helps to engage yourself in an activity that will occupy your attention.”</li> <li>▪ “For example, some people find that they have cravings when they are working at their computer or watching TV. What could you do to distract yourself? One idea is to make a list of engaging activities that you can do. What might some examples be? (e.g., talk to a friend or co-worker, find something to do with your hands like knitting, drawing, crossword puzzle, etc.)”</li> <li>▪ [<i>Refer to appropriate section of packet</i>] “We’d like for you to come up with at least 5 activities that you could do to distract yourself from your cravings.” [<i>Ask some people to share their lists</i>]</li> <li>▪ “Of course you need to remember to have your sweets with you during these activities!”</li> </ul> </li> <li>○ 5. Breathing (<i>from J. Beck</i>) <ul style="list-style-type: none"> <li>▪ “Sometimes distracting yourself can be as easy as turning your attention to your breath. Try focus on your breathing,</li> </ul> </li> </ul>
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	<p>in through your nose for 4 counts and out for 4 counts. What was that like?</p> <ul style="list-style-type: none"> <li>○ Practice           <ul style="list-style-type: none"> <li>▪ “Let’s put these distraction techniques to the real test. I’m going to pass around a bowl of different sweets. Go ahead and take one that is appealing to you and place it on the desk directly in front of you. Now, I’d like you unwrap the food and spend a few seconds touching and smelling it. [Wait about 20 sec] Now, close your eyes and try to distract yourself from your thoughts and feelings about the sweets using one of the distraction techniques we just discussed (positive thinking, positive imagery, mind games, and breathing). If one isn’t working, try another. I’ll tell you when to stop. Go ahead.” [Wait 60 sec]</li> <li>▪ [Solicit participants’ experiences] “How did that go? Did it work? Did you find one technique particularly easy or helpful to use?”</li> </ul> </li> </ul>
1:15	<p>12. Confrontation (<i>from LEARN</i>)</p> <ul style="list-style-type: none"> <li>○ “Tell yourself that you are absolutely not going to eat the food you are cravings.” Don’t give yourself a choice. Tell yourself ‘NO CHOICE.’ Sometimes this will be enough to help you resist giving into your craving.”</li> <li>○ “It might help to imagine that your craving is someone you don’t like who is trying to convince you to eat the food. You want to confront them and let them know who is boss.”           <ul style="list-style-type: none"> <li>▪ “You can talk back, argue, and tell the person or craving that you will not give in: ‘Listen, craving! You want me to eat that chocolate. I am in charge of my own life and what I eat.’”</li> </ul> </li> </ul>
1:20	<p>13. Challenging Negative Thinking (<i>adapted from DPP</i>)</p> <ul style="list-style-type: none"> <li>○ “Another strategy that we want to give you is how to talk back to your negative thoughts that are trying to push you to give into your craving. Everyone has negative thoughts at times. Negative thoughts can lead you to give into your cravings.”</li> <li>○ Before we can confront these thoughts, we have to identify the thoughts we are having.</li> <li>○ 1) Identifying Negative Thoughts           <ul style="list-style-type: none"> <li>▪ “What goes through your mind when you notice you are craving sweets?” [Solicit examples from participants and write on board. Provide examples if necessary.] “You might have the negative thought ‘I can’t do this’ or ‘This is too hard’.”</li> <li>▪ Examine them for any distortions.</li> </ul> </li> <li>○ 2) Cognitive Distortions.           <ul style="list-style-type: none"> <li>▪ “Negative thoughts are often distorted in one way or another. It can often be helpful to examine your craving-</li> </ul> </li> </ul>

	<p>related thoughts and see if they are distorted in some way. “</p> <ul style="list-style-type: none"> <li>• Catastrophic Thinking - this means that you are convinced the worst is going to happen (“The cravings aren’t going away! Might as well give up trying.”)</li> <li>• All or Nothing - This means that you see things in black and white categories (“I gave into the craving and now I’m a complete failure!”)</li> <li>• Overgeneralization - This means that you see a single negative event as a never-ending pattern of defeat. (“If I can’t avoid giving into my craving now, I’ll never be able to!”)</li> <li>• Fortune-telling - You assume that things will turn out badly and feel convinced that your prediction is already an established fact. (“With your cravings, you’ll never be able to resist for long.”)</li> <li>• Emotional reasoning - The idea that just because we feel something means it’s true (“I feel so weak and out of control this must mean that I cannot resist my cravings!”)</li> <li>• Labeling - Instead of describing a behavior, you attach a negative label to yourself (“Face it. You’re a sweet food junkie!”)</li> <li>• Should-ing – This is when you try to motivate yourself with ‘should-s’ and ‘should-not-s’ which leads to feelings of guilt. (“Other people have an easy time resisting their cravings and so should I!”)</li> <li>• Excuse-giving - Blame something or someone else for our problems/difficulties - ‘I don’t have the willpower’ or ‘It’s my co-workers fault for bringing in doughnuts.’</li> <li>• Give-up - Defeat ourselves - ‘This is too hard. I might as well give up!’</li> <li>• Rationalization - Sometimes we convince ourselves that resisting cravings doesn’t matter. You might have thoughts like “It’s only just one cookie. What harm could it do? Or, I can always start tomorrow.” You pretend that it’s not going to be so bad.</li> </ul> <p>○ 3) Talking Back with a Positive Thought</p> <ul style="list-style-type: none"> <li>▪ “It is often very helpful to challenge and counter the negative thoughts.”</li> <li>▪ “Part of this is remembering that your thoughts aren’t necessarily true. Do you really believe these thoughts? If not, what are the arguments against them?”</li> <li>▪ “For example, is the thought ‘I can’t go three days without sweets’ true? Has there ever been a time when you went without sweets? Sure, so you can counter this thought with a positive, more realistic thought which is ‘I’ve been able to</li> </ul>
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	<p>do this in the past, so I can do this again’.”</p> <ul style="list-style-type: none"> <li>▪ “So, let’s take a look at the thoughts on the board. What are some positive thoughts that we can use to counter the negative thoughts?” <ul style="list-style-type: none"> <li>• ‘I don’t have the willpower.’ &gt; ‘It’s hard to change old habits, but I’ll give it a try and see how it works.’</li> <li>• ‘The craving is too strong.’ &gt; ‘It is only a craving, and not a true need.’</li> <li>• ‘This is too hard. I might as well forget it.’ &gt; ‘I’ve successfully resisted cravings in the past, I can do it again.’</li> <li>• ‘It’s only one piece of candy. It doesn’t really matter’&gt; ‘Last time I said this and gave in, I felt really bad afterwards.’</li> <li>• ‘Distractions not working.’ &gt; ‘I’ll try another strategy to get rid of my craving.’</li> </ul> </li> <li>○ Practice [<i>Refer to negative &amp; positive thought record in packet</i>] <ul style="list-style-type: none"> <li>▪ “Let’s practice responding to our negative thoughts that are pushing us to give into our cravings. Again, direct your attention to the sweet that is on your desk. Are there any new thoughts that are coming up for you? Now, using the thought record that you have, I’d like everyone to write down any negative thoughts, and then try to come up with positive thoughts to counter them with.” [<i>Ask participants to share how it went</i>]</li> <li>▪ “There is a new thought record on the next page for you to use during the next three days.”</li> </ul> </li> </ul>
1:45	<p>14. “Angel and Devil” (<i>adapted from DPP</i>)</p> <ul style="list-style-type: none"> <li>○ “Again, we all face temptation, especially when we’re changing lifelong habits.”</li> <li>○ “It’s like there is an Angel and Devil sitting on our shoulders. The Devil is saying, ‘You have to have the sweet. You deserve it. One sweet won’t hurt.’ The Devil is our distorted thoughts.”</li> <li>○ “The Angel is our rational, positive thoughts. ‘Last time I had one sweet I felt guilty. I will feel better if I have a piece of fruit instead’.”</li> <li>○ “This kind of ‘inner battle’ is common. If the Devil starts tempting you, identify and challenge your distortions and talk back with positive thoughts.”</li> <li>○ “Think of a temptation you’ve faced. What might your inner voices say?” (Angel &amp; Devil)</li> </ul>
1:50	<p>15. Evaluating the Pros and Cons of Withstanding Cravings (<i>from J. Beck</i>)</p> <ul style="list-style-type: none"> <li>○ “It is often helpful to logically and methodically determine the pros and cons of making specific choices...So, let’s apply this to the case of whether or not to indulge a craving for sweet food.” <ul style="list-style-type: none"> <li>▪ [<i>Refer to “Pros &amp; Cons”” section of packet</i>] “Write down</li> </ul> </li> </ul>



	the pros and cons of eating sweets.” <i>[Ask participants to share]</i>
2:00	<p>16. Review</p> <ul style="list-style-type: none"> <li>○ “These strategies really do work. Use them over the next 3 days to help yourself not give in to cravings”</li> <li>○ “Let’s review what these strategies are:” <ul style="list-style-type: none"> <li>▪ “Can someone name one of them? Good, now who can give a summary...Okay, yes, I would add that...How about another strategy we discussed?” <ul style="list-style-type: none"> <li>• Distraction (positive thinking, positive imagery, mind games, activity change, breathing)</li> <li>• Confrontation</li> <li>• Identifying negative thoughts</li> <li>• Identifying cognitive distortions</li> <li>• Challenge and counter negative thoughts</li> <li>• Talking back with positive thoughts</li> <li>• Angel &amp; Devil</li> <li>• Pros and cons of resisting cravings</li> </ul> </li> </ul> </li> <li>○ “Which of these strategies seems like they will be the most helpful?” <i>[Ask participants to share]</i> <ul style="list-style-type: none"> <li>▪ “It is often helpful to have reminders with you and so we’d like you to write down the strategies that you think will be most helpful in the space provided in your daily craving rating packet.”</li> </ul> </li> </ul>
2:05	<p>17. Final Practice</p> <ul style="list-style-type: none"> <li>○ “Let’s do one final practice using the strategies for responding to our cravings and negative thoughts that are pushing us to give in to our cravings. When I tell you to, I’d like everyone to try to use the strategies we discussed today.” <ul style="list-style-type: none"> <li>▪ “So everyone should still have their sweet in front of them. I want to you imagine that it’s about 4:30 tomorrow afternoon. You are at work and it’s been a long and stressful day. A co-worker from another department brings you a plate of cookies from a birthday party they were celebrating. <i>[Pass out cookies to everyone.]</i> Maybe you haven’t eaten in a few hours and you feel some hunger. You haven’t had any sweets for a whole day and you are thinking about how delicious they will be. You think, ‘I’ll never make it to the end of the three days without eating some kind of sweet. I might as well just eat the cookies.’ Maybe you think ‘I will hurt her feelings if I don’t eat it’.”</li> <li>▪ “I’d like you to use the techniques we just discussed to counter cravings and any negative thoughts. Go ahead.”</li> <li>▪ <i>[Solicit from participants what that experience was like.]</i></li> </ul> </li> <li>○ “So, during the next three days, you might have some negative thoughts like ‘I’ll never make it to the end of the three days without</li> </ul>

	<p>eating some kind of sweet.’ It will be important to use these strategies to confront these types of negative thoughts.”</p>
2:15	<p>18. Memory Aid: Acronym</p> <ul style="list-style-type: none"> <li>○ As a way to help you remember what we just talked about, we have come up with a memory aid. Use the word DICE. D-I-C-E.</li> <li>○ <b>D: Distract Yourself.</b> You can take control of your mind by distracting yourself from thoughts, feelings, and cravings that you do not want. You can use positive thinking, positive imagery, mind games, activity change, and breathing.</li> <li>○ <b>I: Identify Cognitive Distortions.</b> Remember negative thoughts are often distorted in one way or another. Examine your thoughts to see if they are distorted.</li> <li>○ <b>C: Challenge &amp; Confront Negative Thinking.</b> Don’t just buy into distressing thoughts. Challenge negative thoughts by examining the evidence and countering them with more realistic and positive thoughts.</li> <li>○ <b>E: Evaluate the Pros and Cons for Resisting Cravings.</b> It is often helpful to think logically about the pros and cons of eating sweets.</li> </ul>
2:18	<p>19. Quiz 20. Administer TAQ</p>
2:26	<p>21. Reminders</p> <ul style="list-style-type: none"> <li>○ <i>After intervention script, give the following reminders/cautions:</i> <ul style="list-style-type: none"> <li>▪ “During the period when you cannot eat sweets you may experience cravings to eat sweets. Remember, though, your task over the next 72 hours is not to eat any sweets. Use the strategies we have discussed to try to get rid of your cravings.”</li> <li>▪ “Keep the container of sweets with you wherever you go”</li> <li>▪ “Fill out the measures at 11am, 4pm, and 8pm each day over the next 72 hours. (Please note there are no 8pm or before bed ratings for the 3<sup>rd</sup> day.)”</li> <li>▪ “Attend the final assessment at the time you signed up for at the beginning of group. Remember to bring your measures and the container of sweets with you. You will be asked to complete a final survey at that time as well as complete a taste test. Remember to not eat for 2 hours prior to the final meeting. You will also receive money for participating at that time.”</li> </ul> </li> </ul>

	<p align="center"><b>Acceptance-Based Coping Strategy Group (ABG)</b>  [adapted from Acceptance and Commitment Therapy (Hayes, 1999) and Drexel University's Acceptance-based Weight Loss Program (Forman, 2009)]</p>
<i>Time</i>	
0:05	1. Intro <ul style="list-style-type: none"> <li>○ Welcome</li> <li>○ Check of inclusion/exclusion criteria</li> </ul>
0:10	2. Informed Consent
0:20	3. Rationale <ul style="list-style-type: none"> <li>○ “The purpose of this study is to study cravings. Therefore, we are asking you to try not to eat any sweets for the next three days. At the same time, we are going to give you a small container of sweets to keep with you over the next three days. By carrying these sweets with you, it will ensure that your exposure to sweet food cues is consistent throughout the three day study period. Thus, it is very important for the purposes of the study that you have the sweets with you at all times, meaning at work, in class, at meals, at home, and so on. The three-day period will end at [time] which means the study will end at [time] on [day of week]. So again, during the three days try not to eat any of the sweets (e.g., candy bars, cookies, soda, cakes, ice cream, etc.)”<i>[Distribute boxes of sweets and list of restricted sweets]</i></li> </ul> 4. Measure instruction <ul style="list-style-type: none"> <li>○ “We are going to give each of you a packet to keep with you the next three days. <i>[Distribute packets]</i> In this packet, we ask that you complete ratings of cravings four times a day: 11 am, 4 pm, 8 pm, and before bed. In order to remind you to fill out these measures, we will be sending you text messages as this seems to be the quickest way to reach people. However, we know that not everyone uses text messaging or has a text messaging service and so on this sheet <i>[pass out reminder sheet]</i> we would like for you to indicate the best way for us to contact you so that we can remind you to complete these ratings. Of course, these are just to help you remember. We hope that you will do these ratings at the scheduled times regardless of whether or not you get the reminder. The ratings will only take you a couple of minutes to complete. It is very important that you complete the ratings at the specified time. In order to be able to do this, you need to keep the booklet with you at all times just as you are to keep the container of sweets.”</li> <li>○ “At this time, approximately 72 hours from now, meaning [time] [day of week] you will be asked to come back to return the container of sweets to [collection location], fill out a final, short questionnaire, complete a brief taste test, and receive your money</li> </ul>

	<p>for participating, which will be \$30. We ask that you do not eat for 2 hours prior to your scheduled time. We would like everyone to sign up for a 15 minute time slot. [Pass around final assessment sign-up sheet.]”</p> <p>5. Quick Instructions Review</p> <ul style="list-style-type: none"> <li>○ “During the 3-day period when you cannot eat sweets you may experience cravings to eat sweets. Remember, though, your task over the next 72 hours is not to eat any sweets.”</li> <li>○ <i>Give the following reminders:</i> <ul style="list-style-type: none"> <li>▪ Keep sweets with you wherever you go</li> <li>▪ Try not to eat any sweets</li> <li>▪ Fill out the craving ratings 4 times per day, i.e., 11am, 4pm, 8pm, and before bed. (Please note there are no 8pm or before bed ratings for the 3<sup>rd</sup> day.)</li> <li>▪ Bring measures and container of sweets at [<i>collection spot</i>] during the times of [<i>**:** to **:*</i>]. At that time, you will be asked to complete a final survey, a brief taste test, and you will also receive money for participating. Remember not to eat for two hours prior to your appointment.</li> </ul> </li> </ul> <p>6. Introduction to coping with cravings</p> <ul style="list-style-type: none"> <li>○ “So, over the next three days as you are trying not to eat any sweets, you may experience cravings and it may be hard to resist the urge to eat sweets. The idea behind this study is teach you a few strategies that psychologists have developed to help resist food cravings. We want you to make use of these strategies over the next three days whenever you have a desire to eat sweets. We want to measure how effective these strategies are. So again, the idea is that I am going to teach you some strategies to use whenever you get a craving to eat sweets. As I’m going through these strategies, make sure to ask me any questions you have about how to use them.”</li> <li>○ “To track how clear I am in explaining this to you, and whether you are able to remember what I am saying, I will pass out a short ‘quiz’ at the end that you fill out and give back to me.”</li> </ul>
0:25	<p>7. Questionnaire Packet</p> <ul style="list-style-type: none"> <li>○ Distribute questionnaire Packet</li> <li>○ Individual measurement of weight and height</li> </ul>
0:45	<p>8. Explanation of Cravings</p> <ul style="list-style-type: none"> <li>○ “Food cravings are strong urges to eat a particular food, often highly palatable foods like sweet foods. These foods also tend to be high in fat and calories.”</li> <li>○ “Food cravings are very normal experiences but can be problematic if they lead to too much snacking or binge eating. Since food cravings are often for very tasty and fatty foods, increased consumption of these foods can lead to undesired weight gain.”</li> </ul>

0:50	<p>9. Determinants of food cravings</p> <ul style="list-style-type: none"> <li>○ “Food cravings often occur in response to the food that is around you, like the sweets we are giving you. This is problematic given that our environment is characterized by the presence of high fat and high calorie foods that are typically very tasty. Given this, our environment has been referred to as an obesogenic environment. In this obesogenic environment, we may experience constant urges to eat the good-tasting, plentiful, available food around us.”</li> <li>○ “What makes this even more challenging is that we are hard-wired to want to eat energy dense foods, especially those that are highly tasty. We have a natural/evolved/adaptive inclination to be aware of, seek out and eat high energy foods.”</li> <li>○ “In addition, for some individuals, adverse internal experiences, such as feelings like boredom, sadness, stress, worry, can also lead us to experience unwanted food cravings. In this way, eating serves as a way to cope with negative emotions.”</li> <li>○ Some women report experiencing increases in food cravings prior to their menstrual cycle.”</li> </ul>
0:55	<p>10. Experience of food cravings</p> <ul style="list-style-type: none"> <li>○ <i>[Ask participants about their *experience* of having a food craving.]</i> What does it feel like? <i>[Ask them about previous experiences with going without sweets or other tasty foods.]</i> “What was that like? What were the challenges?”</li> <li>○ “When do you tend to experience food cravings? When you have a food craving, what do you usually do?”</li> <li>○ “Researchers have identified ways to help individuals manage and resist acting on their cravings. During today’s group, we will go over some strategies you can use when you notice that you are having cravings for sweets.”</li> <li>○ <i>[Pass out worksheet]</i> “Here is a workshop packet which we will be using to do various exercises. There are also blank lines where you can take notes or jot down helpful reminders about the techniques we will be providing. These will be helpful to refer back to during the next few days should you experience cravings.”</li> </ul>
1:00	<p>11. Control is the Problem</p> <ul style="list-style-type: none"> <li>○ “We are taught from a young age that we can control our mind, including cravings.”</li> <li>○ “This makes sense given that control is an effective way of dealing with problems in the external world. It’s precisely because it works so well outside the skin that we tend to try it within the skin, not realizing that it can make things worse.”</li> <li>○ “However, psychologists have begun realizing that attempts to control internal experiences are most likely not going to be successful and may even make the experiences worse.”</li> </ul>

	<ul style="list-style-type: none"> <li>▪ “What do I mean by internal experiences? Things like your thoughts: ‘She doesn’t like me’, ‘That was stupid’.”</li> <li>▪ Another type of internal experience is feelings, including emotions like sadness, anxiety and excitement. Cravings and urges to do things (like eat sweets) are internal experiences. So are physical feelings like an itch and sensations like smells and sounds.”</li> <li>○ “Can you think of an example where an attempt to control a thought, feeling or craving made it even worse?” <ul style="list-style-type: none"> <li>▪ “For example, have you ever had a night where you just couldn’t fall asleep? What often happens is that the more you try to fall asleep the more anxious you get and the harder it becomes. Another example would be telling yourself you can’t be anxious before a presentation. What happens?”</li> </ul> </li> <li>○ Utilize <i>Chocolate candy bar</i> exercise [<i>Set candy bar in the middle of the table.</i>] <ul style="list-style-type: none"> <li>▪ “Let’s try an exercise. The idea is for the next minute, do not think at all about this candy bar; don’t think about what it looks like, tastes like, etc. [<i>Silence for approx. one minute.</i>] Now suppose every time you had a thought about the candy bar you instantly gained 25 pounds.” [<i>Silence for approx. one minute.</i>]</li> <li>▪ “What happened? ... Did you think about it?” [<i>Note: If they say I thought of something else, respond with “how did you know you didn’t think about it?”</i>]</li> </ul> </li> <li>○ Utilize <i>Polygraph</i> metaphor: “Here is one more way to demonstrate the limits of control. Imagine you are hooked up to perfect anxiety-reading machine, and someone tells you that if your anxiety goes above a certain level you will be thrown out the window. Would you be able to stay calm? How does this connect to you and the strategies you’ve been using?” <ul style="list-style-type: none"> <li>▪ “So this example shows that we cannot control our anxiety even when we have the most intense motivation to do so. It works the same for cravings. We are wired to have certain responses to food and other internal experiences, such as emotions, that can create strong motivations to engage in unwanted eating behaviors. Paradoxically, the greater the incentive (money or your life) for controlling thoughts/images (chocolate candy bar) or feelings (polygraph), the more acutely you experience them.”</li> </ul> </li> <li>○ “What do you think about your ability to control the sweet cravings that may come up for them during the next 3 days?” <ul style="list-style-type: none"> <li>▪ “If in the next few days, you notice yourself having cravings to eat sweets, then you most likely will not be able to will yourself to *stop* having these cravings, no matter</li> </ul> </li> </ul>
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	<p>how hard you try. In fact, the more desperately you try to get rid of these cravings the more the cravings may begin to bother you.”</p>
1:10	<p>12. Distinction Between Internal and External Control</p> <ul style="list-style-type: none"> <li>○ “Importantly, we have limited or no control over our internal experiences, like cravings, <u>but</u> we do have control over our behaviors.” <ul style="list-style-type: none"> <li>▪ “For those of you with children, I’m sure you have had an experience in which your child had been sick and you were up half the night with him or her. Now, imagine it’s 3am and you’ve just fallen asleep. You awaken to him or her crying again. What might you be thinking and feeling? What would you do? Right, even though you are feeling tired and exhausted, you still get up and take care of him or her. The feelings of tiredness and exhaustion don’t just go away. Rather, you take them with you while you engage in the behavior of getting out of bed and walking to your child’s room.”</li> <li>▪ “For anyone who has had to be somewhere earlier in the morning, whether it be work or school, you have had the experience of having the alarm clock go off. How many of you have felt so tired that you had thoughts of wanting to shut the alarm clock off and go back to sleep? And my guess is there were times when you hit the snooze button 5 times before getting up. What made the difference between the times when you got up right away and the times when you went back to sleep?”</li> </ul> </li> <li>○ “Over the next few days, you will likely experience cravings for sweets. Trying to control or get rid of these cravings may not work and in fact, may backfire. So, what do you do? Do you have to give into them? Is there another option?” <ul style="list-style-type: none"> <li>▪ “Right, not being able to get rid of the cravings does <u>not</u> mean that you have to give into them. If it did, most of us would probably give in every time we saw something delicious to eat, which given today’s food environment would be most of the time!”</li> </ul> </li> <li>○ “We want to present you with the possibility that regardless of whatever you are feeling, thinking, or experiencing internally, you have a choice over what behavior you choose to engage in.”</li> </ul>
1:15	<p>13. Acceptance</p> <ul style="list-style-type: none"> <li>○ “Psychologists have discovered that it is remarkably helpful to accept that we are going to have food cravings no matter what given that we can’t do anything to stop our mind from wanting something that tastes good.”</li> <li>○ “This process of accepting our food cravings without trying to change or get rid of them is <i>acceptance</i>. Acceptance refers to the</li> </ul>

extent to which you are willing to have whatever thoughts, feelings, and cravings that you have.

- Utilize *Tug-of-War with a Monster* metaphor
  - “Imagine that you are on a cliff. You are in a tug-of-war with a giant gross looking monster. The monster is on another cliff and between you is a deep chasm. Both you and the monster are determined to win the tug-of-war. He pulls, you pull harder and vice-versus. You are tired and exhausted.”
    - “What does this metaphor represent?” - “The monster represents troublesome internal experiences, like your cravings, that are trying to pull you and you are trying to pull away from them; constantly trying to pull and pull so that you don’t get dragged into the pit; it represents the constant struggle against urges to eat.”
    - “What is the alternative to staying in the tug-of-war?” - “The alternative is to drop the rope. This means sitting with ones thoughts and feelings and not struggling with them.”
    - “What is the cost of dropping the rope?” - “The monster is still there bothering you. It might not always be pleasant.”
    - “What is the benefit of dropping the rope?” – “You are free to engage in the behaviors you choose to do without having to first get rid of certain thoughts or feelings.”
  - “The monster represents cravings, they are trying to pull you and you are trying to pull away from them. You are constantly trying to pull and pull so that you don’t get dragged into the pit. It’s a constant struggle against cravings. The alternative is to let go and let the craving be there. What would this look like? Do you think you could do it? Have you ever had an experience in which you let a craving just be without struggling with it or giving into it?”
- Utilize *Quicksand* metaphor
  - “Here is another metaphor that might illustrate this point. Let’s imagine that you have decided to go for a walk in the woods. Next thing you know you find yourself in the middle of a swamp, and not only that, you’ve just stepped in quicksand. You slowly feel yourself sinking. What do you do?”
    - “If you are in quicksand, you’re natural inclination is to struggle to push the sand away to get it off of you, but the more you struggle the more you get pulled down (it’s like a vacuum that sucks you down). If you fall in the quicksand, the only way to keep



	<p>yourself from drowning is to do the opposite of what your natural inclination is to do; that is, you need to lie flat and still so that you have a larger surface area.”</p> <ul style="list-style-type: none"> <li>▪ “How does the struggle with the quicksand compare with your struggle with unwanted cravings?”</li> <li>○ “The idea is that over the next three days, when you are trying to resist eating sweets you are likely to have cravings. Your natural inclination is likely going to be to struggle with them and try to get rid of them. However, as we have discussed, this often has the opposite effect of what you want; namely, it may make them more intense and distressing. Thus, in order to successfully resist acting on yours sweet cravings, you need to do the opposite of what your natural tendency is, namely, to accept them. An important note is that acceptance does not mean that you have to like or want the monster or the craving. It means making space for them when they are there, simply because they are there anyway.”</li> <li>○ Utilize <i>Apartment-Warming Party</i> metaphor <ul style="list-style-type: none"> <li>○ “I think I have a way to illustrate this notion that you do not have to like or want your cravings in order to be willing to have them. Imagine that you are having a holiday party. And let’s say you have an aunt, an Aunt Ida, who you are really hoping isn’t coming. She is very annoying and pestering. She criticizes everything...your house, your cooking, everything! You are so excited because it’s about time to eat and she hasn’t arrived! You are thinking that she must not be coming! How relieved you must feel! Then there is a knock on the door and you see that it is none other than Aunt Ida. So what can you do? What are your options? You could tell everyone to be quiet and pretend that no one is home. Or, you can let her in but try to be wherever she is not! So if she goes in the living room, you move into the kitchen and vice versus. What are the benefits of doing that? ...the costs? That sure will make the family dinner difficult! Any other alternatives? Well, you can welcome her to the party, let her in. Can you see how you can fully accept her presence even if you don’t like her or the way she behaves?”</li> <li>○ “So, how could this be a metaphor for accepting feelings and thoughts and cravings that you don’t like?”</li> <li>○ “Although we don’t have much control over our cravings, is it possible that we <i>do</i> have control of our acceptance of cravings?”</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>○ “During the next three days, when you are carrying around sweets while attempting to abstain from them, you will likely experience cravings. Like Aunt Ida, these cravings may be annoying and distressing. You can either use your energy and attention to try and get rid of them, which may backfire as we saw with the chocolate bar and polygraph examples. The alternative is to accept your cravings by letting them be there as they are. You still may not like them and find them distressing, but if you aren’t struggling with them, you can direct your attention and efforts to other areas of your life while still fulfilling your commitment of not eating sweets.”</li> <li>○ “Can you imagine saying to yourself: No matter how strong this craving to eat sweets gets, I’m just going to let it be in my head. I don’t need to make it go away?”</li> <li>○ “Importantly, acceptance is not the same as resignation or giving up. Rather it is means letting go of the struggle with what we cannot control. In this way, it liberates us too”</li> </ul>
1:25	<p>14. Clean vs. Dirty Distress</p> <ul style="list-style-type: none"> <li>○ “It may help to think about your experience with cravings using the distinction of ‘clean’ vs. ‘dirty.’ Clean distress refers to the distress one feels as a result of direct experience with the environment. So, cravings for sweets are normal experiences that often result from exposure to sweets in the environment. Dirty distress refers to distress one feels as a result of struggling with that clean experience, in this case the craving. Dirty distress results when we struggle to get rid of the craving or the distress about the craving. This often makes the craving and associated distress even worse, which is why we call it ‘dirty’ distress. Whereas clean distress is a natural and inevitable part of the human condition, dirty distress is a result of struggling with internal experiences.”</li> <li>○ “Acceptance is a way of responding to the clean distress that does not result in the additional dirty distress. The extent that you can see your cravings as a normal experience and are willing to accept them, the less dirty distress you will experience.”</li> </ul>
1:30	<p>15. Acceptance Practice</p> <ul style="list-style-type: none"> <li>○ “Let’s practice acceptance. I’m going to pass around a bowl of different sweets. Go ahead and take one that is appealing to you and place it on the desk directly in front of you. Now, I’d like you to un-wrap the food and spend a few seconds touching and smelling it. <i>[Wait about 20 sec]</i> Now, close your eyes and I want you to practice being accepting to have whatever thoughts, feeling, and cravings you have without trying to make them go away. Go ahead. <i>[Wait 60 sec]</i><i>[Solicit participants’ experiences]</i> How did that go? Was it challenging? What made it</li> </ul>

	<p>challenging?”</p> <ul style="list-style-type: none"> <li>○ “If you found that difficult, do not give up yet! Acceptance is a new way of responding to your internal experiences and so it takes practice. We have some strategies that will foster this stance of acceptance.”</li> <li>○ “Let’s talk about some strategies to help you be more <i>accepting</i>...”</li> </ul>
1:35	<p>16. Mindfulness</p> <ul style="list-style-type: none"> <li>• “The first strategy is <i>mindfulness</i>. Mindfulness refers to the process of noticing and observing your internal experience without judgment or evaluation.” <ul style="list-style-type: none"> <li>○ “Try to just sit back and notice whatever internal experiences you are having right this second. What do you see, hear, smell, and feel? What are you thinking? Was that possible?”</li> </ul> </li> <li>• Utilize <i>Leaves on a Stream</i> mindfulness exercise <ul style="list-style-type: none"> <li>○ “Sometimes it is easier to get this concept by using a metaphor. Imagine a stream with lots of leaves floating in it. The leaves are moving down the stream, some slowly, and some fast. Now think of the stream as your mind, and each leaf as a different internal experience that is going by. So one leaf is the thought that you forgot to call your friend back, another is a feeling of being very hot, etc.”</li> </ul> </li> <li>• Utilize <i>Train Under a Bridge</i> mindfulness exercise <ul style="list-style-type: none"> <li>○ “Here’s a similar metaphor. Imagine that you are standing at a railway bridge gazing down at a long freight train rumbling along that has many, many train cars that stretch far into the distance. The cars are open-topped, so you can see the freight inside each one. The freight is labeled and is, in fact, the content of your mind: some of the cars have your thoughts, some have your emotions and cravings, and some have noises, sights, and sounds you are sensing. So one car might have “smell of perfume” another might have the thought “I am never going to get this work done”, one might have the feeling of hopelessness and one might have a craving to eat sweets.”</li> </ul> </li> <li>• Mindfulness Practice <ul style="list-style-type: none"> <li>○ “Let’s practice being mindful of our thoughts, feelings, and cravings. Again, direct your attention to the sweet that is on your desk. You can utilize the leaves on the stream or the train under a bridge exercise. You can also simply watch your thoughts, feelings, and cravings come and go. Let’s try this for the next couple of minutes. As soon as you notice that you have gotten caught up in a train of thinking or if you start struggling with a craving or unwanted feeling, just notice this and gently return your attention back to mindful observing. How did that go? Were you able to just notice your internal</li> </ul> </li> </ul>

	<p>experiences? What made it difficult? Can you see yourself using one of these mindfulness exercises in the next three days when you have cravings? Are there any difficulties that you anticipate with using these exercises?"</p>
1:45	<p>17. Defusion/Distancing</p> <ul style="list-style-type: none"> <li>○ "Another very important way to help foster acceptance and decrease the distress you have about cravings is to distance yourself from the craving. Distancing refers to the process of stepping back from internal experiences and seeing them from what they are. Another word that we use for this is <i>defusion</i>."</li> <li>○ "When we distance or defuse from a craving we 'step back from' ourselves/our cravings and see ourselves having the cravings from a psychological distance. When we are distanced we can experience cravings (or any thought or feeling) as just a feeling our mind is having at that moment. Maybe we can even realize this craving feeling is nothing more than chemical and electrical activity in our brain. When we have this kind of distance from our thoughts and feelings we can choose not to do what those thoughts and feelings are 'telling' us to do. In other words, we can say: 'I can see myself having a craving to eat sweets right now. It's a really strong craving. But I'm going to let that feeling just be and choose not to eat sweets'."</li> <li>○ "Conjure up the image of looking down at the train from the bridge. In your mind's eye, can you imagine this perspective so that you can see each thought or feeling or craving you have <i>from a distance</i>? Now can you imagine being <i>inside</i> a particular car where the only thing in your field of vision is a huge sign that says 'Craving to eat sweets!' That difference between being inside the train car and seeing the train car from a distance is what we mean by distancing."</li> <li>○ "Another way to think about defusion is to put your hand right up to your face [<i>demonstrate</i>]. What do you see? Right, nothing, just darkness. Now, slowly move your hand away from you face. Now, what do you see? Right, you can see the outline of your hand, marks, wrinkles, etc. How does this relate to defusion? Right, when we are fused to our thoughts we cannot see anything else, any other possibilities. But if we are able to step back from them we can see them for what they are. Thoughts that do not necessarily have to be bought into or followed."</li> <li>○ Defusion Techniques <ul style="list-style-type: none"> <li>▪ "Let's talk about some techniques to help you get some distance from your cravings so that you can be more accepting..." [<i>List strategies on board with examples</i>]</li> <li>▪ 1) "Thank your mind"</li> <li>▪ 2) "I'm having the thought/feeling that..." <ul style="list-style-type: none"> <li>• "Putting the stem, 'I'm having the thought that,' or</li> </ul> </li> </ul> </li> </ul>

	<p>‘I’m having the feeling that,’ in front of your thoughts or feelings allows you to have some distance from those thoughts or feelings. Let’s practice...For example, you may think ‘I can’t do this’ or ‘I really want to eat sweets.’ Try putting the stem, ‘I’m having the thought that’ in front of it...”</p> <ul style="list-style-type: none"> <li>▪ 3) And/But <ul style="list-style-type: none"> <li>• “Just because you have a feeling, doesn’t mean that you have to act on it. Often times we say to ourselves, ‘I want to stop eating sweets but the urge is so strong.’ Try replacing the ‘and’ with ‘but’.”</li> </ul> </li> <li>▪ “Which distancing strategy did you find most helpful? Make a note in your pamphlet.”</li> </ul> <p>○ Defusion Exercise</p> <ul style="list-style-type: none"> <li>▪ “Let’s practice using these strategies. I want everyone to direct their attention to the sweet you have on your desk. Take a minute to notice each thought and feeling and craving that you are experiencing right now. Now, try to step back, <i>see</i> yourself having the experience, and describe it to yourself. So say things to yourself like “Now I’m seeing that my mind is having the thought that this would taste so good right now or I’m having the thought that three days is too long to go without sweets.” You might try ‘thanking your mind’ for any urges you are having to eat the chocolate. You might find yourself saying, “I want to go without sweets for three days <i>but</i> even this is too hard. How will I be able to resist when no one is watching!” Try replacing the ‘but’ with ‘and’ and say ‘I want to go without sweets for three days <i>and</i> the experience I’m having with my craving right now is hard.’ Now, I’d like you to go ahead and try.”</li> <li>▪ “What was that like? Were you able to achieve distance?”</li> </ul> <p>○ “A benefit of distancing or defusing from your cravings is that you create a space between your cravings and the behavior of eating. The idea here is that your actions don’t have to follow from thoughts and feelings. In other words, you can have cravings for sweets and not eat sweets.”</p>
1:55	<p>18. Willingness/Uncoupling</p> <ul style="list-style-type: none"> <li>○ “When we are mindful and defused from our internal experiences, we then have the option of choosing whether or not we want to be willing to have them. Willingness is the ability to behave in a desired way regardless of the internal experiences that are present. Willingness is the alternative to saying ‘I’m only going to resist giving into my craving if I can make it go away’.”</li> <li>○ Utilize <i>Monsters on the Bus Metaphor</i> <ul style="list-style-type: none"> <li>▪ “Let’s do an illustration to think through this idea. Let’s</li> </ul> </li> </ul>

	<p>pretend that I'm up here driving a bus down the "no sweets" highway <i>[turn around]</i> and let's pretend that you are the monsters in the back of the bus who represent distressing things that you have to go through as you try to resist sweets. For example, one of you may say this is too hard or another one may say sweets are so good and it comforts you and another one of you would say it's so terrible to feel deprived like this. While I'm driving the bus I want you to be out loud saying these things." <i>[Everyone starts saying things and then the bus driver gets up and argues with different people.]</i></p> <ul style="list-style-type: none"> <li>• Ask participants to explain how this relates to the concept of willingness. <i>[Relate thoughts and feelings to disturbing passengers on the bus, and emphasize that in trying to control these "passengers," the bus driver has let the passengers control the bus.]</i></li> <li>• "What is a different way or responding?" <i>[Continue to drive]</i></li> </ul> <p>▪ "Let's try this again. Again, I'd like you to say those distressing thoughts out-loud again." <i>[This time the leader continues to drive without turning around or engaging with the thoughts.]</i> Ask participants about the difference between this time and the last time. Let them know that you weren't ignoring their voices, even though it may have looked like it. Say something like, "I definitely heard you guys...and sometimes it was uncomfortable. In fact, you really annoyed me and it was really unpleasant. I can't pretend that you guys aren't there." You can also ask them if they thought it was easy for you and say something like "No it wasn't easy for me; in fact, it was really distressing and distracting. I felt discouraged at times."</p> <ul style="list-style-type: none"> <li>• "What would it mean in your own life to be driving that bus with the passengers there?"</li> <li>• <i>[Explicitly relate driving the bus with continually engaging in the behavior of resisting sweets.]</i> "You are driving down the road to 'no sweets'; and on the bus are these passengers (urges to eat, wanting more, stress). We are suggesting that you can let them be, accept them, and continue to resist eating sweets. You can refocus attention and energy the goal of resisting sweets rather than engaging and struggling with your cravings."</li> <li>• "If you are constantly trying to deal with people on the bus, you are constantly getting pulled off your path. Can you continue to drive while they are bothering you? Trying to make thoughts and feelings go away</li> </ul>
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	<p>keeps you from moving forward. You need to keep on setting a course for what you want to be doing.”</p> <ul style="list-style-type: none"> <li>• “People get stuck in the mode of thinking that when they have intense urges to eat something, as long as they can get rid of or distract themselves from them, they think they are okay. However, lots of times we can’t get rid of them, and we end up eating things we don’t want to be eating. When I was driving the bus the first time, I did so with the assumption that in order for me to keep driving on the ‘no sweets’ road, I needed to get rid of the urges. We are trying to switch your perspective to see that these thoughts and feelings, no matter how distressing, cannot make you do anything; they cannot derail you.’</li> </ul> <ul style="list-style-type: none"> <li>○ <i>Riding the Wave</i> <ul style="list-style-type: none"> <li>▪ “Another example to help you understand willingness is to think of your cravings as a wave. Like waves, your cravings, and all internal experiences, go up and down. It is important to remember that you can ride the wave of cravings. Eventually the cravings will go down, but if you try to force them down it often doesn’t work. You have to be willing to go where they go.”</li> </ul> </li> <li>○ Utilize <i>Chocolate and Carrot</i> exercise           <ul style="list-style-type: none"> <li>▪ [Give each participant a carrot.] “We want to do an exercise to practice willingness. So everyone should have a sweet and a carrot. Now, we’d like you to write down what thoughts and feelings you have that may motivate you to eat the sweet rather than the carrot. [Give them time to write some of these down. Then break them into pairs and have one partner give the other partner the list. For the first minute, the partner with the lists reads it to the other person. Tell the person reading the list that her goal is to get her partner to want to eat the sweets (consider saying things like ‘Carrots are not any good’ or ‘Don’t worry about calories.’) After a few minutes, switch and have the other partner read the list. Finally, ask all participants to eat the carrot while letting all of the thoughts they are having just be there. ] What was this experience like? You can have the thought of not wanting to eat the carrot and wanting to eat the sweet but at the same time choose to eat the carrot.”</li> </ul> </li> </ul>
2:05	<p>19. Values</p> <ul style="list-style-type: none"> <li>○ “In different areas of our life we have different values and goals. In each area of our life, there are barriers that come up for us. In those areas that you do live up to your values, how do you do it (e.g., getting up in middle of the night to help</li> </ul>

	<p>son)?”“In areas where you don’t live up to value, maybe use these same strategies of acceptance”</p> <ul style="list-style-type: none"> <li>○ Note that in one’s life we constantly have to put energy into living in accordance with ones values. “It is often not easy to live every day in accordance with values. Some people might have less of a struggle in terms of their weight, but struggle in other areas. You are all here b/c eating healthier is a goal that you have. You may have different reasons for being here depending on your values.”</li> <li>○ “So let’s talk about why you value learning how to manage your food cravings and eat healthier. We’d like everyone to list 10 reasons why they value choosing to eat healthier.” [Refer to section of pamphlet. After participants have time to fill in some values, ask them to share with the group.]</li> <li>○ “We know how difficult it is to be working everyday to make these changes, and one of the things that may help you to make these changes is to keep in the forefront of your mind the reasons and values that you have that are related to eating healthy.”</li> <li>○ “You have been able to identify your values and your eating goals, but why is that we as humans find it so hard to live in accordance with these values?” <ul style="list-style-type: none"> <li>▪ “We don’t like having certain feelings and thoughts and we get caught up in trying to make them go away.” <ol style="list-style-type: none"> <li>1. Choosing immediate gratification at the cost of moving in a valued direction</li> <li>2. Provide example, such as wanting to eat ice cream when you get home and are feeling stressed and exhausted. “It might make you feel good to eat the ice cream, but it’s not going to make the stress or exhaustion go away. In fact, it can bring more distress because you may feel upset at yourself for breaking your calorie goal and it moves you way from your valued path of healthy eating.”</li> </ol> </li> </ul> </li> <li>○ “Why is this so hard? These are the things you value, and yet is it so hard to live consistently. Why do you think that is?” <ul style="list-style-type: none"> <li>▪ Not having values in mind</li> <li>▪ Short term vs. long term mind</li> <li>▪ Conflicting values</li> </ul> </li> <li>○ “Important to bring values to the forefront of your mind. Important to be mindful of your ultimate values even though</li> </ul>
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	<p>as human beings we are more oriented to short term.”</p> <ul style="list-style-type: none"> <li>▪ “First part is to know what your values are”</li> <li>▪ “Second part is to integrate values into behaviors”             <ol style="list-style-type: none"> <li>1. “What is making me want to eat this food?”</li> <li>2. “What are the alternatives?”</li> <li>3. “Is eating this food what I want to choose? Is it consistent with my values? Is it taking me closer or further from my values?”</li> </ol> </li> <li>○ Note that values “dignify” acceptance             <ul style="list-style-type: none"> <li>▪ Mindfulness: being aware of thoughts, urges and feelings that have in the past motivated us to eat</li> <li>▪ Willingness: being willing to have thoughts, urges and feelings relating to eating without having to act on them</li> <li>▪ Defusion: being distant or seeing yourself as separate from thoughts, urges, and feelings that motivate us to eat</li> <li>▪ Note that values DIGNIFY these concepts</li> </ul> </li> </ul>
2:12	<p>20. Review</p> <ul style="list-style-type: none"> <li>○ “These strategies really do work. Use them over the next 3 days to help yourself not give in to cravings.”</li> <li>○ “Let’s review what these strategies are.”             <ul style="list-style-type: none"> <li>▪ “Can someone name one of them? Good, now who can give a summary...Okay, yes, I would add that...How about another strategy we discussed?”                 <ul style="list-style-type: none"> <li>• Acceptance</li> <li>• Clean vs. Dirty Distress</li> <li>• Mindfulness</li> <li>• Defusion</li> <li>• Willingness/Uncoupling</li> <li>• Values</li> </ul> </li> </ul> </li> </ul>
2:15	<p>21. Final Practice</p> <ul style="list-style-type: none"> <li>○ “Let’s do one final practice using the strategies for responding to our cravings and negative thoughts that are pushing us to give in to our cravings. When I tell you to, I’d like everyone to try to use the strategies we discussed today.             <ul style="list-style-type: none"> <li>▪ “So everyone should still have their sweet in front of them. I want you to imagine that it’s about 4:30 tomorrow afternoon. You are at work and it’s been a long and stressful day. A co-worker from another department brings you a plate of cookies from a birthday party they</li> </ul> </li> </ul>

	<p>were celebrating. <i>[Pass out cookies to everyone.]</i> Maybe you haven't eaten in a few hours and you feel some hunger. You haven't had any sweets for a whole day and you are thinking about how delicious they will be. You think, 'I'll never make it to the end of the three days without eating some kind of sweet. I might as well just eat the cookies.' Maybe you think 'I will hurt her feelings if I don't eat it.'</p> <ul style="list-style-type: none"> <li>▪ I'd like you to use the techniques we just discussed to respond to cravings and craving-related thoughts. Go ahead"</li> <li>▪ <i>[Solicit from participants what that experience was like.]</i></li> </ul> <ul style="list-style-type: none"> <li>○ "So, during the next three days, you might have some cravings and negative thoughts like 'I'll never make it to the end of the three days without eating some kind of sweet.' It will be important to use these strategies in response to your cravings and thoughts."</li> </ul>
2:18	<p>22. Memory Aid: Acronym</p> <ul style="list-style-type: none"> <li>○ As a way to help you remember what we just talked about, we have come up with a memory aid. Use the word DAWN. D-A-W-N, like the dawn of a new day now that you will begin your life anew, using these amazing strategies I've just taught you!</li> <li>○ D: Distancing. Step back from your thoughts and feelings and cravings. See them from a distance. "I see myself having a craving for chocolate right now."</li> <li>○ A: Acceptance. Whatever thoughts or feelings or cravings your mind creates are okay. They do not have to be changed or eliminated.</li> <li>○ W: Willingness. Be willing to have what your mind gives you. No matter how strong a craving is, you can let it be. You don't have to make it go away.</li> <li>○ N: The Now. Keep your LONG-term values present with you in the moment. Also, stay mindful of what it is you are thinking, feeling, and craving in any given moment.</li> </ul>
2:20	<p>23. Quiz 24. Administer TAQ</p>
2:25	<p>25. Reminders</p> <ul style="list-style-type: none"> <li>○ <i>After intervention script, give the following reminders/cautions:</i> <ul style="list-style-type: none"> <li>▪ "During the period when you cannot eat sweets you may experience cravings to eat sweets. Remember, though, your task over the next 72 hours is not to eat any sweets. Use the strategies we have discussed to try to get rid of your cravings."</li> <li>▪ "Keep the container of sweets with you wherever you go"</li> <li>▪ "Fill out the measures at 11am, 4pm, and 8pm each day over the next 72 hours. (Please note there are no 8pm or</li> </ul> </li> </ul>

	<p>before bed ratings for the 3<sup>rd</sup> day.)”</p> <ul style="list-style-type: none"><li>▪ “Attend the final assessment at the time you signed up for at the beginning of group. Remember to bring your measures and the container of sweets with you. You will be asked to complete a final survey at that time as well as complete a taste test. Remember to not eat for 2 hours prior to the final meeting. You will also receive money for participating at that time.”</li></ul>
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	No Intervention Group (NIG)
<i>Time</i>	
0:05	1. Intro <ul style="list-style-type: none"> <li>○ Welcome</li> <li>○ Check of inclusion/exclusion criteria</li> </ul>
0:10	2. Informed Consent <ul style="list-style-type: none"> <li>○ Distribute Informed Consent and provide brief overview.</li> </ul>
0:20	3. Rationale <ul style="list-style-type: none"> <li>○ “The purpose of this study is to study cravings. Therefore, we are asking you to try not to eat any sweets for the next three days. At the same time, we are going to give you a small container of sweets to keep with you over the next three days. By carrying these sweets with you, it will ensure that your exposure to sweet food cues is consistent throughout the three day study period. Thus, it is very important for the purposes of the study that you have the sweets with you at all times, meaning at work, in class, at meals, at home, and so on. The three-day period will end at [time] which means the study will end at [time] on [day of week]. So again, during the three days try not to eat any of the sweets (e.g., candy bars, cookies, soda, cakes, ice cream, etc.)”<b>[Distribute boxes of sweets and list of restricted sweets]</b></li> </ul> 4. Measure instruction <ul style="list-style-type: none"> <li>○ “We are going to give each of you a packet to keep with you the next three days. <b>[Distribute packets]</b> In this packet, we ask that you complete ratings of cravings four times a day: 11 am, 4 pm, 8 pm, and before bed. In order to remind you to fill out these measures, we will be sending you text messages as this seems to be the quickest way to reach people. However, we know that not everyone uses text messaging or has a text messaging service and so on this sheet <b>[pass out reminder sheet]</b> we would like for you to indicate the best way for us to contact you so that we can remind you to complete these ratings. Of course, these are just to help you remember. We hope that you will do these ratings at the scheduled times regardless of whether or not you get the reminder. The ratings will only take you a couple of minutes to complete. It is very important that you complete the ratings at the specified time. In order to be able to do this, you need to keep the booklet with you at all times just as you are to keep the container of sweets.”</li> <li>○ “At this time, approximately 72 hours from now, meaning [time] [day of week] you will be asked to come back to return the container of sweets to [collection location], fill out a final, short questionnaire, complete a brief taste test, and receive your money for participating, which will be \$30. We ask that you do not eat</li> </ul>

	<p>for 2 hours prior to your scheduled appointment. We would like everyone to sign up for a 15 minute time slot. [Pass around final assessment sign-up sheet.]”</p> <p>5. Quick Instructions Review</p> <ul style="list-style-type: none"> <li>○ “During the 3-day period when you cannot eat sweets you may experience cravings to eat sweets. Remember, though, your task over the next 72 hours is not to eat any sweets.”</li> <li>○ <i>Give the following reminders:</i> <ul style="list-style-type: none"> <li>▪ “Keep sweets with you wherever you go”</li> <li>▪ “Try not to eat any sweets”</li> <li>▪ “Fill out the craving ratings 4 times per day, i.e., 11am, 4pm, 8pm, and before bed. (Please note there are no 8pm or before bed ratings for the 3<sup>rd</sup> day.)”</li> <li>▪ “Bring measures and container of Sweets at [<i>collection spot</i>] during the times of [<i>**:** to **:**</i>]. At that time, you will be asked to complete a final survey, a brief taste test, and you will also receive money for participating. Remember not to eat for two hours prior to your appointment.”</li> </ul> </li> </ul>
0:25	<p>6. Questionnaire Packet</p> <ul style="list-style-type: none"> <li>○ Distribute questionnaire Packet</li> <li>○ Individual measurement of weight and height</li> </ul>
0:55	<p>7. Reminders</p> <ul style="list-style-type: none"> <li>○ “During the period when you cannot eat sweets you may experience cravings to eat sweets. Remember, though, your task over the next 72 hours is not to eat any sweets.”</li> <li>○ “Keep the container of sweets with you wherever you go”</li> <li>○ “Fill out the measures at 11am, 4pm, and 8pm each day over the next 72 hours.”</li> <li>○ “Attend the final assessment at the time you signed up for at the beginning of group. Remember to bring your measures and the container of sweets with you. You will be asked to complete a final survey at that time as well as complete a taste test. Remember to not eat for 2 hours prior to the final meeting. You will also receive money for participating at that time.”</li> </ul>

**APPENDIX D: QUIZZES****Quiz for Standard Cognitive-Based Coping Strategies Group**

- 1) Good ways to distract yourself from the craving include (name three):
  - a) \_\_\_\_\_
  - b) \_\_\_\_\_
  - c) \_\_\_\_\_
- 2) By using an “activity change” as a way to control a craving, we mean:
  - a) Removing yourself from the chocolates
  - b) Getting away from other things that are making you hungry
  - c) Do something different
  - d) Go to another location
- 3) An example of challenging negative thinking is:
  - a) Thinking positively about the chocolates
  - b) Thinking about something else
  - c) Asking yourself if the thought you are having is really true or not
  - d) Saying to yourself that you must not eat the chocolates.
- 4) The last strategy we talked about was evaluating the \_\_\_\_\_ and \_\_\_\_\_ of withstanding cravings.
- 5) The Acronym DICE stands for:
  - a) D \_\_\_\_\_
  - b) I \_\_\_\_\_
  - c) C \_\_\_\_\_
  - d) E \_\_\_\_\_

### Quiz for Acceptance-based Coping Strategy Group

- 1) When I start to have a craving for chocolate, I should:
  - a) Try not to think about the chocolate
  - b) Focus your attention on the craving
  - c) Acknowledge that you have no control over the craving
  - d) Strengthen your will power to resist the craving
- 2) The Leaves on a Stream and Train metaphors can be helpful to (circle as many as apply):
  - a) See your craving as separate from yourself
  - b) Notice your cravings in a way that makes them go away
  - c) Distract yourself from actually thinking about chocolate
  - d) Help you to see a craving as no more than a craving.
- 3) Defusion/distancing means (circle as many as apply):
  - a) Removing oneself from the cause of the craving
  - b) Decreasing the craving
  - c) Stepping back from your thoughts
  - d) Reminding ourselves that we are not our thoughts
- 4) The Acronym DAWN stands for:
  - a) D \_\_\_\_\_
  - b) A \_\_\_\_\_
  - c) W \_\_\_\_\_
  - d) N \_\_\_\_\_

## APPENDIX E: TABLES

**Table 1**

*Descriptive Statistics for Demographic Characteristics and Study Variables Assessed at Baseline*

Baseline measures	<i>n</i> = 72			
	<i>M</i>	<i>SD</i>	Min	Max
Age	32.51	13.51	18	59
Height (m)	1.64	0.07	1.42	1.79
Weight (kg)	89.25	19.01	56.91	147.73
BMI (kg/m <sup>2</sup> )	33.25	6.50	25.46	57.69
PFS <sup>a</sup>	47.15	13.39	18	72
FCQ-T	30.29	9.22	12	50
EI-Emotional Eating	2.76	0.66	1.17	4
EI-Restraint	2.49	0.55	1.17	3.67

*Note.* BMI = Body Mass Index, PFS = Power of Food Scale, FCQ-T = Food Craving Questionnaire-Trait version, EI-Emotional Eating = Emotional Eating subscale of the Eating Inventory, EI-Restraint = Restraint subscale of the Eating Inventory.

<sup>a</sup>*n* = 71.



**Table 2***Percentages of Categorical Baseline Variables by Group*

	CBG <i>n</i> = 26			ABG <i>n</i> = 22			NIG <i>n</i> = 24		
Ethnicity	W 42% <i>n</i> =11	AA 27% <i>n</i> =7	Other 31% <i>n</i> =8	W 41% <i>n</i> =9	AA 32% <i>n</i> =7	Other 27% <i>n</i> =6	W 33% <i>n</i> =8	AA 38% <i>n</i> =9	Other 29% <i>n</i> =7
US-Born	Yes 100% <i>n</i> =26	No 0% <i>n</i> =0		Yes 91% <i>n</i> =20	No 9% <i>n</i> =2		Yes 79% <i>n</i> =19	No 21% <i>n</i> =5	
Dieting status	Yes 42% <i>n</i> =11	No 58% <i>n</i> =15		Yes 41% <i>n</i> =9	No 59% <i>n</i> =13		Yes 25% <i>n</i> =6	No 75% <i>n</i> =18	
	<i>n</i> = 25			<i>n</i> = 21			<i>n</i> = 24		
Employment status	FT 36% <i>n</i> =9	PT 32% <i>n</i> =8	No Income 32% <i>n</i> =8	FT 43% <i>n</i> =9	PT 24% <i>n</i> =5	No Income 33% <i>n</i> =7	FT 29% <i>n</i> =7	PT 42% <i>n</i> =10	No Income 29% <i>n</i> =7
Student status	FT 36% <i>n</i> =9	PT 20% <i>n</i> =5	Not Student 44% <i>n</i> =11	FT 43% <i>n</i> =9	PT 9% <i>n</i> =2	Not Student 48% <i>n</i> =10	FT 58% <i>n</i> =14	PT 8% <i>n</i> =2	Not Student 33% <i>n</i> =8
Student type	UG 48% <i>n</i> =12	G 8% <i>n</i> =2	Not Student 44% <i>n</i> =11	UG 33% <i>n</i> =7	G 19% <i>n</i> =4	Not Student 48% <i>n</i> =10	UG 42% <i>n</i> =10	G 25% <i>n</i> =6	Not Student 33% <i>n</i> =8
Relationship status	S 52% <i>n</i> =13	M 32% <i>n</i> =8	NLP 16% <i>n</i> =4	S 67% <i>n</i> =14	M 14% <i>n</i> =3	NLP 19% <i>n</i> =4	S 54% <i>n</i> =13	M 21% <i>n</i> =5	NLP 25% <i>n</i> =6

*Note.* W= White, AA = African American, FT = Full-Time, PT = Part-Time, UG = Undergraduate, G = Graduate, S = Single, M = Married or living with partner, NLP = Not living with partner.

**Table 3***Comparison of Continuous Baseline Variables by Group*

	CBG		ABG		NIG				
	<i>n</i> = 26		<i>n</i> = 22		<i>n</i> = 24				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> <sub>(2,69)</sub>	<i>p</i>	$\eta_p^2$
Age	28.92	11.02	36.77	15.16	32.50	13.78	2.07	.13	.06
BMI	33.59	8.55	34.43	5.86	31.81	3.99	.99	.38	.03
PFS <sup>a</sup>	47.08	14.54	51.28	12.02	43.42	12.75	2.03	.14	.06
FCQ-T	32.35	9.38	31.27	9.34	27.17	8.44	2.22	.12	.06
EI-Emotional Eating	2.69	.69	2.94	.65	2.67	.61	1.20	.35	.03
EI-Restraint	2.40	.60	2.42	.58	2.64	.43	1.43	.25	.04

Note. CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, NIG = No Intervention Group, BMI = Body Mass Index, PFS = Power of Food Scale, FCQ-T = Food Craving Questionnaire-Trait version, EI-Emotional Eating = Emotional Eating subscale of the Eating Inventory, EI-Restraint = Restraint subscale of the Eating Inventory.

<sup>a</sup>*n* for CBG = 25; Error *df* = 68.

**Table 4***Comparison of Categorical Baseline Variables by Group*

	Pearson chi-square	<i>df</i>	<i>p</i>	Phi
Ethnicity	.78	4	.94	.10
US-Born	6.19	2	.05	.29
Dieting status	1.94	2	.38	.16
Employment status	1.75	4	.78	.16
Student Status	3.56	4	.47	.23
Student type	3.34	4	.50	.22
Relationship status	2.63	4	.62	.19

**Table 5***Correlations Between Baseline Variables that Differed Across Groups and Continuous Outcome Variables*

		FCQ-S	Craving frequency	Craving distress	Self-reported consumption (z)
Age	Pearson correlation	-.162	-.069	-.108	-.176
	<i>p</i>	.175	.565	.368	.140
PFS	Pearson correlation	.234	.330	.259	.195
	<i>p</i>	.050	.005	.029	.103
FCQ-T	Pearson correlation	.220	.300*	.278*	.213
	<i>p</i>	.064	.010	.018	.073

*Note.* *n* = 72; PFS = Power of Food Scale, *n* = 71; FCQ-T = Food Craving Questionnaire–Trait version; FCQ-S = Food Craving Questionnaire–State version.

**Table 6**

*Independent Samples T-Tests Comparing Those Born in the United States and Those Born Outside the United States on Primary Outcome Variables that Differed Across Groups*

	<i>Born in US</i> <i>n = 65</i>		<i>Born outside US</i> <i>n = 7</i>		<i>t</i> <sub>(70)</sub>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
FCQ-S	20.49	5.31	23.30	7.51	-1.28	.21	-.43
Craving frequency	2.67	.63	2.84	.86	-.68	.50	-.23
Craving distress	2.15	.70	2.31	.98	-.55	.59	-.19
Self-reported consumption ( <i>z</i> )	-.01	1.92	.11	1.51	-.16	.87	-.07

*Note.* FCQ-S = Food Craving Questionnaire-State version.

**Table 7***Comparison of Continuous Baseline Variables Between CBG and ABG*

	CBG		ABG					
	<i>n</i> = 26		<i>n</i> = 22					
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	d
Age	28.92	11.02	36.77	15.16	-2.02	37.65	.05	-.59
BMI	33.59	8.55	34.43	5.86	-.39	46	.70	-.11
PFS <sup>a</sup>	47.08	14.54	51.28	12.02	-1.07	45	.29	-.31
FCQ-T	32.35	9.38	31.27	9.34	.40	46	.69	.12
EI-Emotional Eating	2.69	.69	2.94	.65	1.20	.35	.03	-.37
EI-Restraint	2.40	.60	2.42	.58	1.43	.25	.04	-.03

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, BMI = Body Mass Index, PFS = Power of Food Scale, FCQ-T = Food Craving Questionnaire–Trait version, EI-Emotional Eating = Emotional Eating subscale of the Eating Inventory, EI-Restraint = Restraint subscale of the Eating Inventory.

<sup>a</sup>*n* for CBG = 25.

**Table 8***Comparison of Categorical Baseline Variables Between CBG and ABG*

	Pearson chi-square	<i>df</i>	<i>p</i>	Phi
Ethnicity	.15	2	.93	.06
US-Born	2.47	1	.12	-.23
Dieting status	.01	1	.92	.01
Employment status	.41	2	.81	.10
Student status	.99	2	.61	.15
Student type	1.70	2	.43	.19
Relationship status	1.98	2	.37	.21

**Table 9**

*Correlations Between Baseline Variables that Differed Between CBG and ABG and Continuous Outcome Variables*

		FCQ-S	Craving frequency	Craving distress	Self-reported consumption (z)
Age	Pearson correlation	-.21	-.10	-.16	-.17
	<i>p</i>	.16	.52	.27	.24
EI-Emotional Eating	Pearson correlation	.18	.14	.12	.04
	<i>p</i>	.22	.34	.42	.81

*Note.*  $n = 48$ , EI-Emotional Eating = Emotional Eating subscale of the Eating Inventory, FCQ-S = Food Craving Questionnaire–State version.



**Table 10***Comparison of Treatment Acceptability and Satisfaction Ratings by Group*

	ABG		CBG				
	<i>n</i> = 22		<i>n</i> = 26				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i> <sub>(46)</sub>	<i>p</i>	<i>d</i>
Expected Frequency of Use	4.18	.66	4.40	.77	-.68	.50	.31
Expected Helpfulness	4.05	.72	3.96	.82	-.37	.71	.12
Effectiveness	3.77	.75	3.85	.93	.30	.77	.09
Satisfaction	4.00	.93	4.15	.83	.61	.55	.17
Helpfulness	3.82	.91	4.04	.96	.81	.42	.24
Difficulty Understanding	5.00	.87	5.12	1.21	.37	.71	.11
Difficulty Implementing	3.86	.89	4.23	.99	1.34	.19	.39
Future Use	3.73	.55	3.54	.58	- 1.15	.26	.34
Future Resistance	3.62	.50	3.50	.67	.68	.50	.20

*Note.* ABG = Acceptance-Based Group, CBG = Cognitive-Based Group.

**Table 11***Percentages for Treatment Utilization Ratings by Group*

CBG ( <i>n</i> = 26)								
Item	Extent attempted				Extent successful			
	Not at all	A little	A lot	Missing or n/a	Not at all	A little	A lot	Missing or n/a
Thinking of something else	11.5% ( <i>n</i> =3)	23.1% ( <i>n</i> =6)	65.4% ( <i>n</i> =17)	0% ( <i>n</i> =0)	3.8% ( <i>n</i> =1)	19.3% ( <i>n</i> =5)	57.7% ( <i>n</i> =15)	19.2% ( <i>n</i> =5)
Accept the craving as it is without trying to change it	53.8% ( <i>n</i> =14)	30.8% ( <i>n</i> =8)	15.4% ( <i>n</i> =4)	0% ( <i>n</i> =0)	0% ( <i>n</i> =0)	34.6% ( <i>n</i> =9)	11.5% ( <i>n</i> =3)	53.8% ( <i>n</i> =14)
Challenge negative thoughts	7.7% ( <i>n</i> =2)	42.3% ( <i>n</i> =11)	50.0% ( <i>n</i> =13)	0% ( <i>n</i> =0)	7.7% ( <i>n</i> =2)	23.1% ( <i>n</i> =6)	53.8% ( <i>n</i> =14)	15.4% ( <i>n</i> =4)
Evaluate pros and cons of eating sweets	19.2% ( <i>n</i> =5)	42.3% ( <i>n</i> =11)	30.8% ( <i>n</i> =8)	7.7% ( <i>n</i> =2)	0% ( <i>n</i> =0)	42.3% ( <i>n</i> =11)	30.8% ( <i>n</i> =8)	26.9% ( <i>n</i> =7)
Notice the craving, step back from it, and see it as a normal experience	30.8% ( <i>n</i> =8)	38.5% ( <i>n</i> =10)	26.9% ( <i>n</i> =7)	3.8% ( <i>n</i> =1)	7.7% ( <i>n</i> =2)	26.9% ( <i>n</i> =7)	30.8% ( <i>n</i> =8)	34.6% ( <i>n</i> =9)
Stay mindful of long-term values	7.7% ( <i>n</i> =2)	38.5% ( <i>n</i> =10)	46.2% ( <i>n</i> =12)	7.7% ( <i>n</i> =2)	11.5% ( <i>n</i> =3)	30.8% ( <i>n</i> =8)	42.3% ( <i>n</i> =11)	15.4% ( <i>n</i> =4)
Engage in another activity	0% ( <i>n</i> =0)	23.1% ( <i>n</i> =6)	73.1% ( <i>n</i> =19)	3.8% ( <i>n</i> =1)	0% ( <i>n</i> =0)	15.4% ( <i>n</i> =4)	80.8% ( <i>n</i> =21)	3.8% ( <i>n</i> =1)
Keep sweets out of my sight	19.2% ( <i>n</i> =5)	30.8% ( <i>n</i> =8)	50.0% ( <i>n</i> =13)	0% ( <i>n</i> =0)	3.8% ( <i>n</i> =1)	19.2% ( <i>n</i> =5)	53.8% ( <i>n</i> =14)	23.1% ( <i>n</i> =6)
Eat food besides sweets	3.8% ( <i>n</i> =1)	34.6% ( <i>n</i> =9)	57.7% ( <i>n</i> =15)	3.8% ( <i>n</i> =1)	3.8% ( <i>n</i> =1)	30.8% ( <i>n</i> =8)	57.7% ( <i>n</i> =15)	7.7% ( <i>n</i> =2)
ABG ( <i>n</i> = 22)								
Thinking of something else	13.6% ( <i>n</i> =3)	36.4% ( <i>n</i> =8)	45.5% ( <i>n</i> =10)	4.5% ( <i>n</i> =1)	0% ( <i>n</i> =0)	22.7% ( <i>n</i> =5)	63.6% ( <i>n</i> =14)	13.6% ( <i>n</i> =3)
Accept the craving as it is without trying to change it	0% ( <i>n</i> =0)	31.8% ( <i>n</i> =7)	59.1% ( <i>n</i> =13)	9.1% ( <i>n</i> =2)	4.5% ( <i>n</i> =1)	36.4% ( <i>n</i> =8)	59.1% ( <i>n</i> =13)	0% ( <i>n</i> =0)
Challenge negative thoughts	50% ( <i>n</i> =11)	27.3% ( <i>n</i> =6)	13.6% ( <i>n</i> =3)	9.1% ( <i>n</i> =2)	0% ( <i>n</i> =0)	22.7% ( <i>n</i> =5)	27.3% ( <i>n</i> =6)	50% ( <i>n</i> =11)
Evaluate pros and cons of eating sweets	13.6% ( <i>n</i> =3)	59.1% ( <i>n</i> =13)	18.2% ( <i>n</i> =4)	9.1% ( <i>n</i> =2)	4.5% ( <i>n</i> =1)	59.1% ( <i>n</i> =13)	18.2% ( <i>n</i> =4)	18.2% ( <i>n</i> =4)
Notice the craving, step back from it, and see it as a normal experience	18.2% ( <i>n</i> =4)	50% ( <i>n</i> =6)	27.3% ( <i>n</i> =6)	4.5% ( <i>n</i> =1)	4.5% ( <i>n</i> =1)	22.7% ( <i>n</i> =5)	50% ( <i>n</i> =11)	22.7% ( <i>n</i> =5)
Stay mindful of long-term values	18.2% ( <i>n</i> =4)	22.7% ( <i>n</i> =5)	50% ( <i>n</i> =11)	9.1% ( <i>n</i> =2)	9.1% ( <i>n</i> =2)	13.6% ( <i>n</i> =3)	59.1% ( <i>n</i> =13)	18.2% ( <i>n</i> =4)

	Not at all	A little	A lot	Missing or n/a	Not at all	A little	A lot	Missing or n/a
Engage in another activity	18.2% (n=4)	31.8% (n=7)	40.9% (n=9)	9.1% (n=2)	4.5% (n=1)	27.3% (n=6)	50% (n=11)	18.2% (n=4)
Keep sweets out of my sight	31.8% (n=7)	22.7% (n=5)	36.4% (n=8)	9.1% (n=2)	13.6% (n=3)	18.2% (n=4)	36.4% (n=8)	31.8% (n=7)
Eat food besides sweets	9.1% (n=2)	27.3% (n=6)	54.5% (n=12)	9.1% (n=2)	4.5% (n=1)	31.8% (n=7)	54.5% (n=12)	9.1% (n=2)

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group.

**Table 12***Group Differences in Use of and Success with Coping Strategies*

	CBG			ABG						
<b>Cognitive-based coping strategies</b>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>
Thinking of something else (attempted)	26	2.54	.71	21	2.33	.73	.98	45	.34	.29
Thinking of something else (successful)	21	2.67	.58	19	2.74	.45	-.43	38	.67	-.13
Challenge negative thoughts (attempted)	26	2.42	.64	20	1.60	.75	3.99	44	<.001	1.18
Challenge negative thoughts (successful)	22	2.55	.67	11	2.55	.52	.00	31	1.00	0
Evaluate pros and cons of eating sweets (attempted)	24	2.13	.74	20	2.05	.61	.36	42	.72	.12
Evaluate pros and cons of eating sweets (successful)	19	2.42	.51	18	2.17	.51	1.51	35	.14	.49
Engage in another activity (attempted)	25	2.76	.44	20	2.25	.79	2.60	28.14	.02	.80
Engage in another activity (successful)	25	2.84	.37	18	2.56	.62	1.74	25.94	.09	.55
	CBG			ABG						
<b>Acceptance-based coping strategies</b>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>d</i>
Accept the craving as it is without trying to change it (attempted)	26	1.62	.75	20	2.65	.49	-5.63	42.96	<.001	-1.63
Accept the craving as it is without trying to change it (successful)	12	2.25	.45	22	2.55	.60	-1.50	32	.15	-.57
Notice the craving, step back from it, and see it as a normal experience (attempted)	25	1.96	.79	21	2.10	.70	-.61	44	.55	-.19
Notice the craving, step back from it, and see it as a normal experience (successful)	17	2.35	.70	17	2.59	.62	-1.04	32	.31	-.36

	<i>CBG</i>			<i>ABG</i>						
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>D</i>
Stay mindful of long-term values (attempted)	24	2.42	.65	20	2.35	.81	.30	42	.76	.10
Stay mindful of long-term values (successful)	22	2.36	.73	18	2.61	.70	-1.09	38	.28	-.35
	<i>CBG</i>			<i>ABG</i>						
<b>Behavioral Strategies<sup>a</sup></b>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>	<i>D</i>
Keep sweets out of my sight (attempted)	26	2.31	.79	20	2.05	.89	1.04	44	.30	.31
Keep sweets out of my sight (successful)	20	2.65	.59	15	2.33	.82	1.34	33	.19	.45
Eat foods besides sweets (attempted)	25	2.56	.58	20	2.50	.69	.32	43	.75	.09
Eat foods besides sweets (successful)	24	2.58	.58	20	2.55	.61	.19	42	.85	.05

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group.

<sup>a</sup>Not specifically recommended in either intervention group.

**Table 13***Correlations Between Sweet Craving Ratings and Self-Reported Sweet Consumption*

		FCQ-T	FCQ-S	Craving frequency	Craving distress
Self-reported consumption (z)	Pearson correlation	.27	.41	.45	.45
	<i>p</i>	.07	.004	.001	.001

*Note.*  $n = 48$ , FCQ-T = Food Craving Questionnaire–Trait version, FCQ-S = Food Craving Questionnaire–State version.

**Table 14***Logistic Regression Examining Cravings on Candy Container Consumption*

	B	SE	Wald	df	p	Odds Ratio
FCQ-T	-.04	.04	.76	1	.38	.96
FCQ-S	.21	.09	5.44	1	.02	1.23
Craving frequency	1.62	.72	5.12	1	.02	5.06
Craving distress	1.49	.66	5.04	1	.03	4.41

*Note.*  $n = 48$ , FCQ-T = Food Craving Questionnaire-Trait version, FCQ-S = Food Craving Questionnaire-State version.

**Table 15***Correlations Between Power of Food and EI-Emotional Eating Scales and Outcome Variables*

		FCQ-T	FCQ-S	Craving frequency	Craving distress	Self-reported consumption
PFS ( <i>n</i> = 47)	Pearson correlation	.78	.32	.32	.29	.23
	<i>p</i>	<.001	.03	.03	.049	.11
EI-Emotional Eating ( <i>n</i> = 48)	Pearson correlation	.46	.18	.14	.12	.04
	<i>p</i>	.001	.22	.34	.42	.81

*Note.* PFS = Power of Food Scale, EI-Emotional Eating = Emotional Eating subscale of the Eating Inventory, FCQ-T = Food Craving Questionnaire-Trait version, FCQ-S = Food Craving Questionnaire-State version.



**Table 16**

*Logistic Regression Examining Impact of Power of Food Scale and EI-Emotional Eating Scale on Candy Container Consumption*

	<i>n</i>	B	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio
PFS	47	-.04	.03	1.41	1	.24	.96
EI-Emotional Eating	48	-1.08	.63	.57	1	.09	.34

*Note.* PFS = Power of Food Scale, EI-Emotional Eating = Emotional Eating subscale of the Eating Inventory.

**Table 17***Independent Samples T-Tests Examining Effect of Group on Cravings and Consumption*

	CBG		ABG		$t_{(46)}$	$p$	$d$
	$(n = 26)$		$(n = 22)$				
	$M$	$SD$	$M$	$SD$			
FCQ-S	20.91	5.81	18.73	4.29	1.46	.15	.43
Craving frequency	2.71	.72	2.55	.54	.84	.41	.25
Craving distress	2.19	.77	2.01	.51	.94	.35	.28
Self-reported consumption (z)	.20	2.63	.21	1.61	-.01	1.00	-.005

*Note.*  $n = 48$ , CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, FCQ-S = Food Craving Questionnaire-State version.

**Table 18***Group by Power of Food Scale Interaction Effect on Outcome*

	CBG ( <i>n</i> = 25)			ABG ( <i>n</i> = 22)					
	Low	Moderate	High	Low	Moderate	High			
<i>n</i>	11	7	7	6	8	8			
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i> (2, 41)	<i>p</i>	$\eta_p^2$
FCQ-S	18.88(5.26)	19.22(.87)	24.51(7.40)	15.17(3.87)	19.46(4.01)	20.66(3.57)	.94	.40	.04
Craving frequency	2.48(.64)	2.59(.48)	3.03(.95)	2.10(.50)	2.54(.30)	2.90(.55)	.32	.73	.02
Craving distress	1.98(.58)	1.98(.38)	2.61(1.12)	1.70(.30)	2.06(.53)	2.20(.55)	.62	.54	.03
Self-reported consumption	-.20(1.22)	-.45(.72)	1.54(4.79)	-.33(.83)	.04(1.51)	.78(2.08)	.29	.75	.01

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, FCQ-S = Food Craving Questionnaire-State version.

**Table 19***Group by Power of Food Scale-Food Present Factor Interaction Effect on Outcome*

	CBG ( <i>n</i> = 25)			ABG ( <i>n</i> = 22)					
	Low	Moderate	High	Low	Moderate	High			
<i>n</i>	12	7	6	5	11	6			
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i> (2, 41)	<i>P</i>	$\eta_p^2$
FCQ-S	19.19(4.85)	18.37(2.05)	25.83(7.15)	17.06(5.73)	19.49(3.65)	18.72(4.52)	2.71	.08	.12
Craving frequency	2.52(.61)	2.45(.55)	3.22(.88)	2.24(.62)	2.54(.37)	2.83(.67)	.66	.52	.03
Craving distress	2.06(.56)	1.75(.34)	2.81(1.08)	1.76(.38)	2.00(.48)	2.25(.60)	1.79	.18	.08
Self-reported consumption	-.19(1.16)	-.54(.72)	1.94(5.12)	-.40(.97)	.48(2.06)	.21(1.03)	1.36	.27	.06

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, FCQ-S = Food Craving Questionnaire-State version.

**Table 20***Group by EI–Emotional Eating Scale Interaction Effect on Outcome*

	CBG ( <i>n</i> = 26)			ABG ( <i>n</i> = 22)					
	Low	Moderate	High	Low	Moderate	High			
<i>n</i>	8	14	4	6	8	8			
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i> <sub>(2,42)</sub>	<i>p</i>	$\eta_p^2$
FCQ-S	16.60(4.98)	22.78(4.30)	22.98(8.49)	17.58(3.27)	18.61(3.47)	19.70(5.78)	1.20	.31	.05
Craving frequency	2.40(.72)	2.79(.48)	3.04(1.33)	2.32(.47)	2.66(.25)	2.61(.77)	.25	.78	.01
Craving distress	1.91(.65)	2.25(.62)	2.58(1.38)	1.90(.45)	2.05(.53)	2.06(.57)	.43	.66	.02
Self-reported consumption	-.21(1.31)	-.31(.68)	2.83(6.39)	.96(2.36)	-.31(1.09)	.16(1.33)	2.54	.09	.11

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, FCQ-S = Food Craving Questionnaire-State version.

**Table 21***Group Differences in Hunger Ratings*

	CBG ( <i>n</i> = 25)		ABG ( <i>n</i> = 19)		<i>t</i> <sub>(42)</sub>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
How hungry do you feel from 1 to 9, 1 being “not at all” and 9 being “as hungry as I ever felt”?	5.12	2.01	5.21	2.42	-.14	.89	-.04
How strong is your desire to eat right now on a scale of 1 to 9, 1 being “very weak” and 9 being “very strong”?	5.48	2.37	6.11	2.16	-.90	.37	-.28
How much food do you think you could eat right now on a scale of 1 to 9, 1 being “nothing at all” and 9 being “a large amount”?	5.48	1.90	5.47	2.20	.10	.99	.01
How full does your stomach feel right now on a scale of 1 to 9, 1 being “not at all full” and 9 being “very full”?	3.92	1.98	3.84	2.50	.12	.91	.04

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group.

**Table 22***Interaction Effect of Group and Dieting Status on Outcome Among High Restraint Eaters*

	CBG		ABG				
	(n = 9)		(n = 5)				
	Dieting	Not Dieting	Dieting	Not Dieting			
	(n = 3)	(n = 6)	(n = 2)	(n = 3)			
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>F</i> <sub>(1,10)</sub>	<i>p</i>	$\eta_p^2$
FCQ-S	21.50 (6.56)	18.48(4.89)	19.65(3.18)	19.77(3.58)	.31	.59	.03
Craving frequency	2.87(.74)	2.28(.57)	3.05(.07)	2.43(.32)	.002	.96	.00
Craving distress	2.50(.56)	1.98(.53)	2.80(.00)	1.90(.26)	.50	.49	.05
Self-reported consumption	.35(2.18)	-.80(.33)	.05(1.47)	-.94(.09)	.02	.90	.002

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, FCQ-S = Food Craving Questionnaire-State version.

**Table 23**

*Logistic Regression Assessing Impact of Group and Dieting Status on Candy Container Consumption Among High Restraint Eaters*

Reference Group	Dieting status	B	SE	Wald	df	p	Odds Ratio
CBG (n = 9)	Yes (n = 3)	-.22	2.49	.01	1	.93	.80
	No (n = 6)	.22	2.49	.01	1	.93	1.25
ABG (n = 5)	Yes (n = 2)	.22	2.49	.01	1	.93	1.25
	No (n = 3)	-.22	2.49	.01	1	.93	.80

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group.



**Table 24**

*Proportion of High Restraint Eaters Who Were Abstinent Versus Non-abstinent from the Candy Container by Intervention Group and Dieting Status*

Group	Abstinent		Non-Abstinent	
	Dieting Status			
	Yes	No	Yes	No
CBG ( <i>n</i> = 9)	14.3% ( <i>n</i> = 2)	35.7% ( <i>n</i> = 5)	7.1% ( <i>n</i> = 1)	7.1% ( <i>n</i> = 1)
ABG ( <i>n</i> = 5)	7.1% ( <i>n</i> = 1)	14.3% ( <i>n</i> = 2)	7.1% ( <i>n</i> = 1)	7.1% ( <i>n</i> = 1)

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group.

**Table 25***Main Effect of Group on Outcome with NIG Included*

	CBG ( <i>n</i> = 25)		ABG ( <i>n</i> = 22)		NIG ( <i>n</i> = 24)				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> <sub>(2, 65)</sub>	<i>p</i>	$\eta_p^2$
FCQ-S	20.55	5.64	18.73	4.29	22.46	5.91	4.00	.023	.11
Craving frequency	2.67	.71	2.55	.54	2.78	.66	1.86	.16	.05
Craving distress	2.15	.76	2.01	.51	2.29	.84	1.63	.20	.05
Self-reported consumption ( <i>z</i> )	.22	2.68	.21	1.61	-.41	.82	.53	.59	.02

*Note.* The following variables were included as covariates: Born-US, Food Craving Questionnaire-Trait version, and Power of Food Scale; CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, NIG = No Intervention Group, FCQ-S = Food Craving Questionnaire-State version.

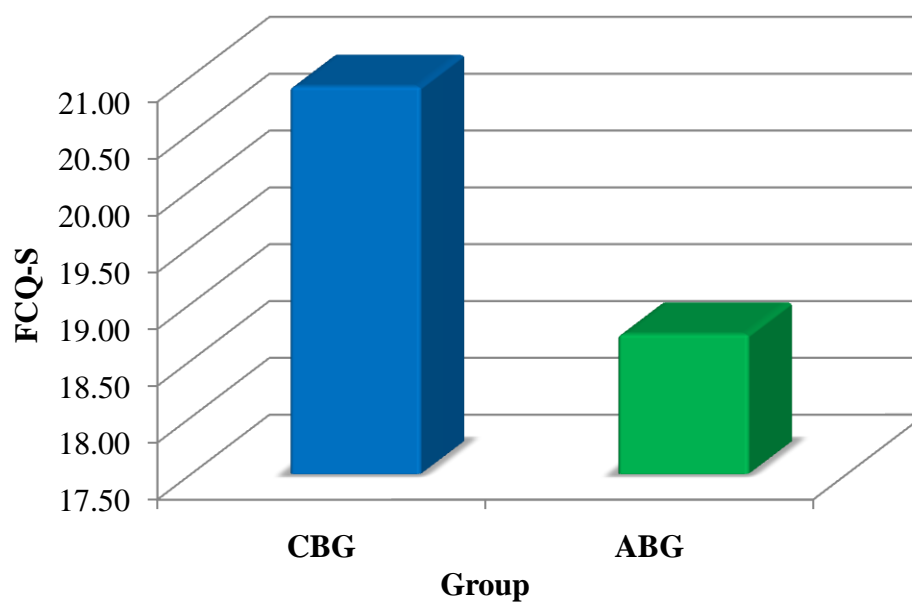
**Table 26**

*Logistic Regression Assessing Impact of Group on Candy Container Consumption with NIG Included*

Group	Reference Group	B	SE	Wald	df	p	Odds Ratio
CBG	NIG	2.436	1.303	3.497	1	.061	11.428
ABG	NIG	1.133	1.344	.711	1	.399	3.106
ABG	CBG	-1.303	1.030	1.598	1	.206	.272
NIG	CBG	-2.436	1.303	3.497	1	.061	.088
CBG	ABG	1.303	1.030	1.598	1	.206	3.679
NIG	ABG	-1.133	1.344	.711	1	.399	.322

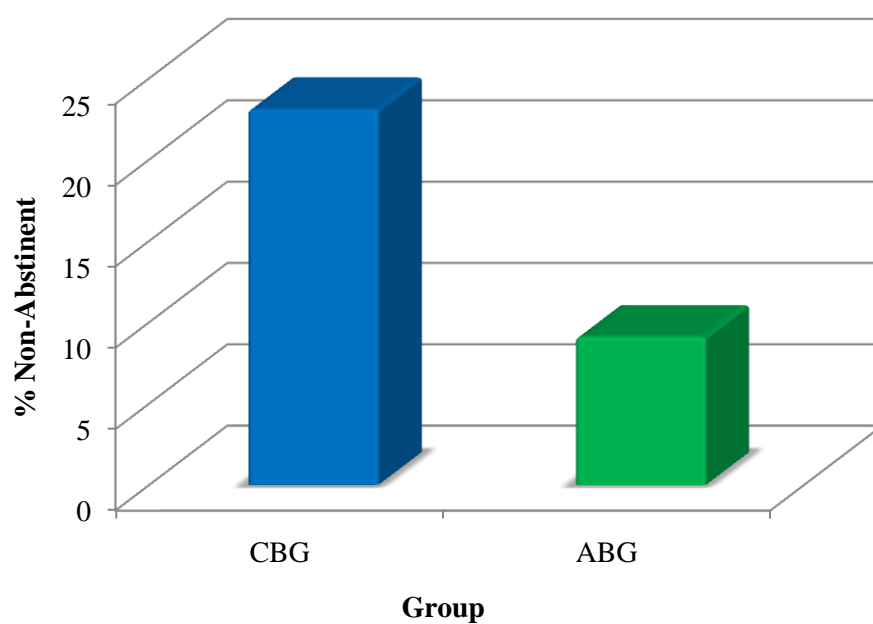
*Note.* The following variables were included as covariates: Born-US, Food Craving Questionnaire-Trait version, and Power of Food Scale; CBG = Cognitive-Based Group, ABG = Acceptance-Based Group, NIG = No Intervention Group.

## APPENDIX F: FIGURES



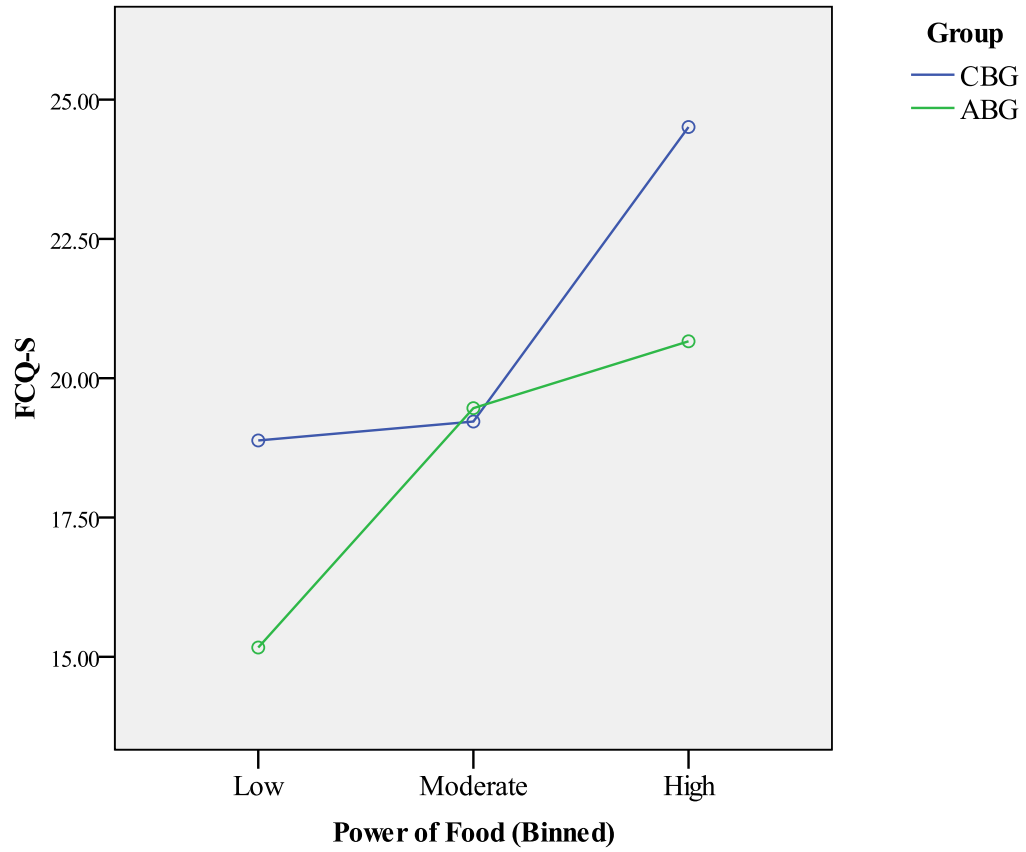
**Figure 1. Group Difference in Sweet Cravings**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $t_{(46)} = 1.46$ ,  $p = .15$ ,  $d = .43$ .



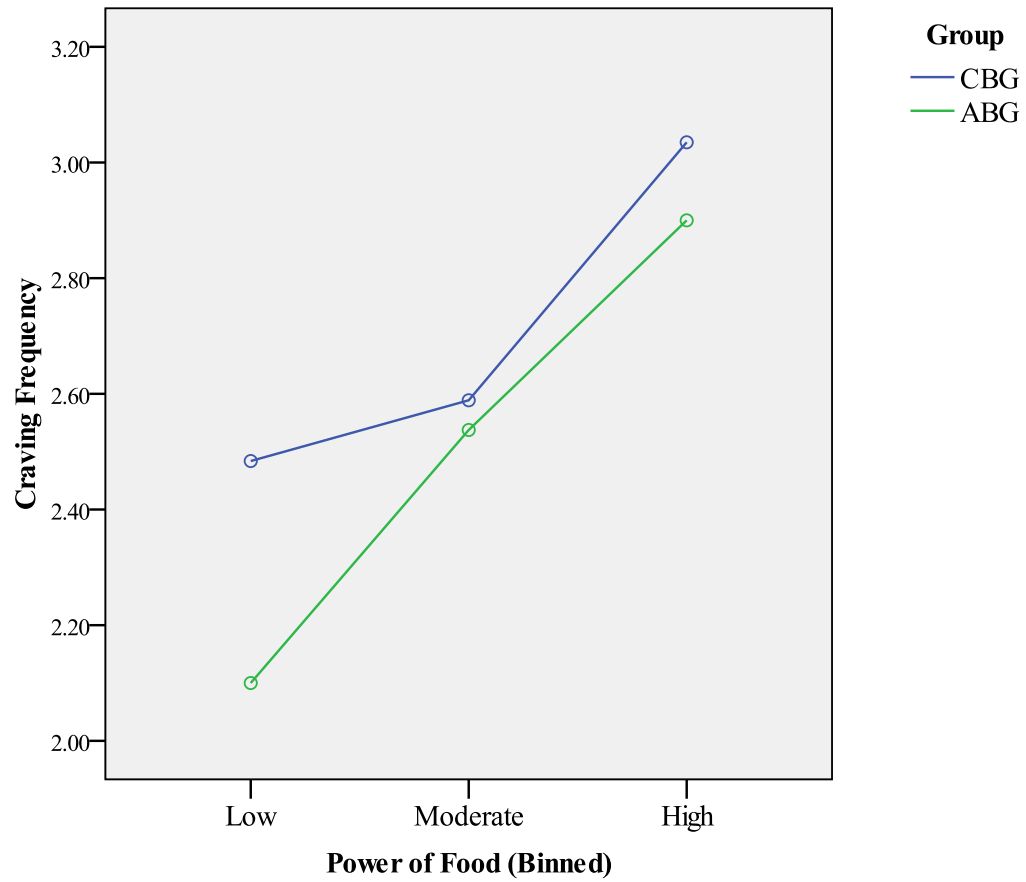
**Figure 2. Group Difference in Percent Non-Abstinent from Candy Container**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $\chi^2_{(1)} = 1.68$ ,  $p = .20$ ,  $\phi = -.19$ .



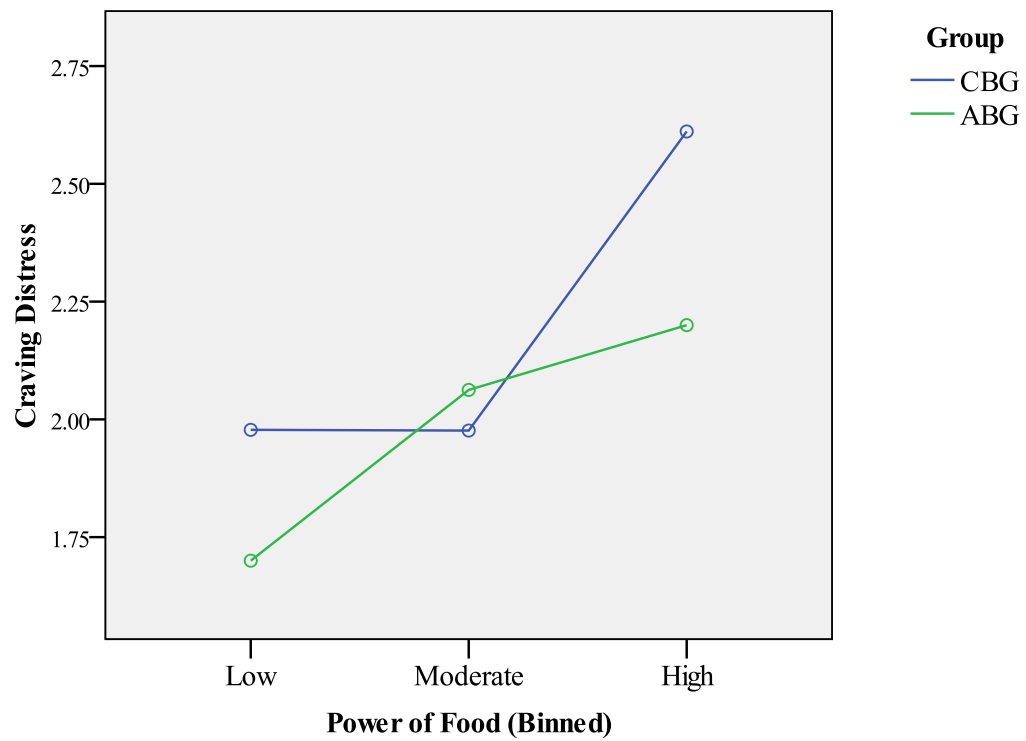
**Figure 3. Group by Power of Food Interaction Effect on Food Craving Questionnaire-State Version**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 41)} = .94$ ,  $p = .40$ ,  $\eta_p^2 = .04$ .



**Figure 4. Group by Power of Food Interaction Effect on Craving Frequency**

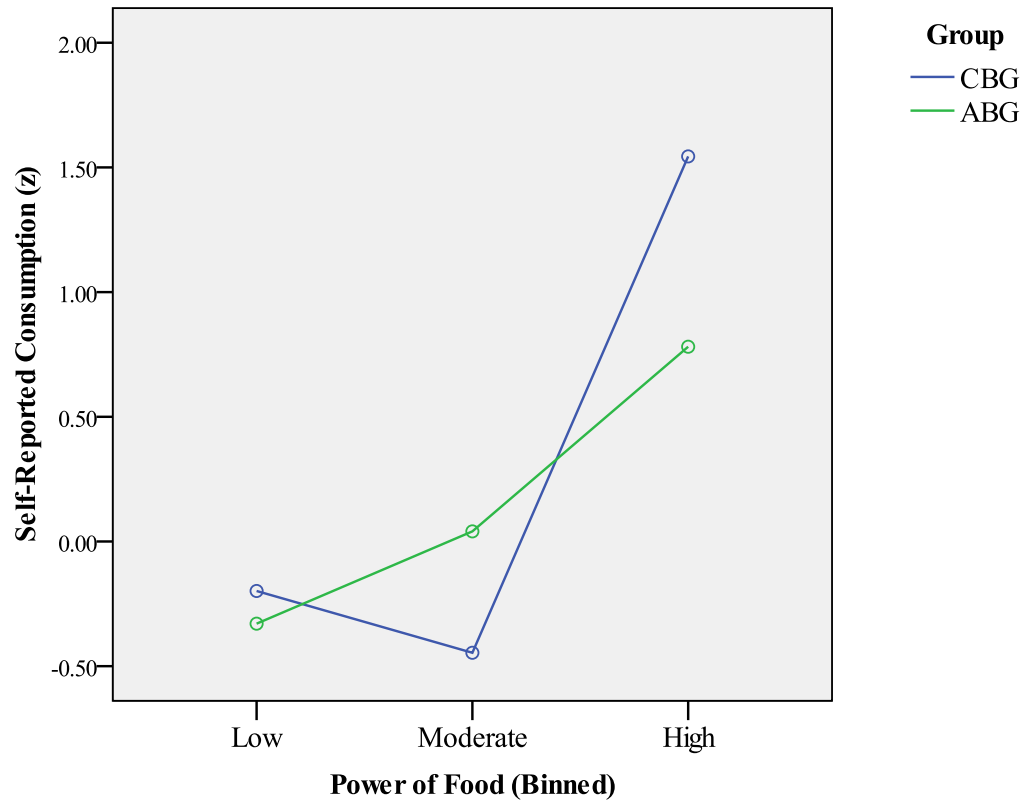
*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 41)} = .32$ ,  $p = .73$ ,  $\eta_p^2 = .02$ .



**Figure 5. Group by Power of Food Interaction Effect on Craving Distress**

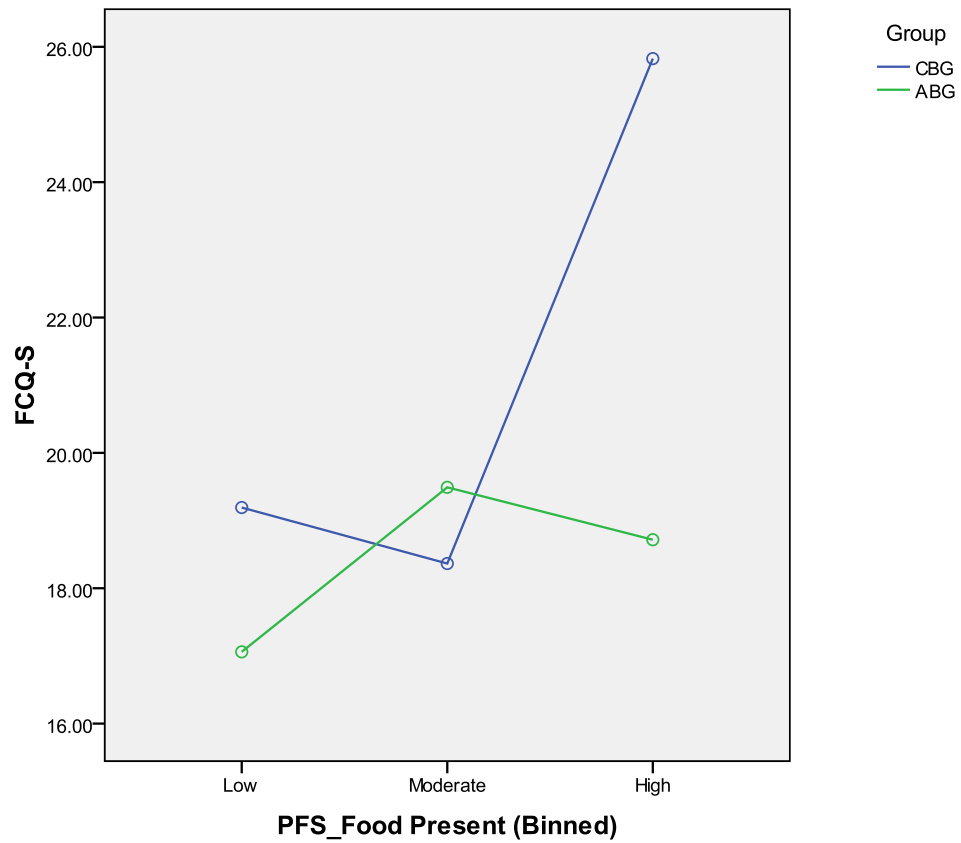
*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 41)} = .62$ ,  $p = .54$ ,  $\eta_p^2 = .03$ .





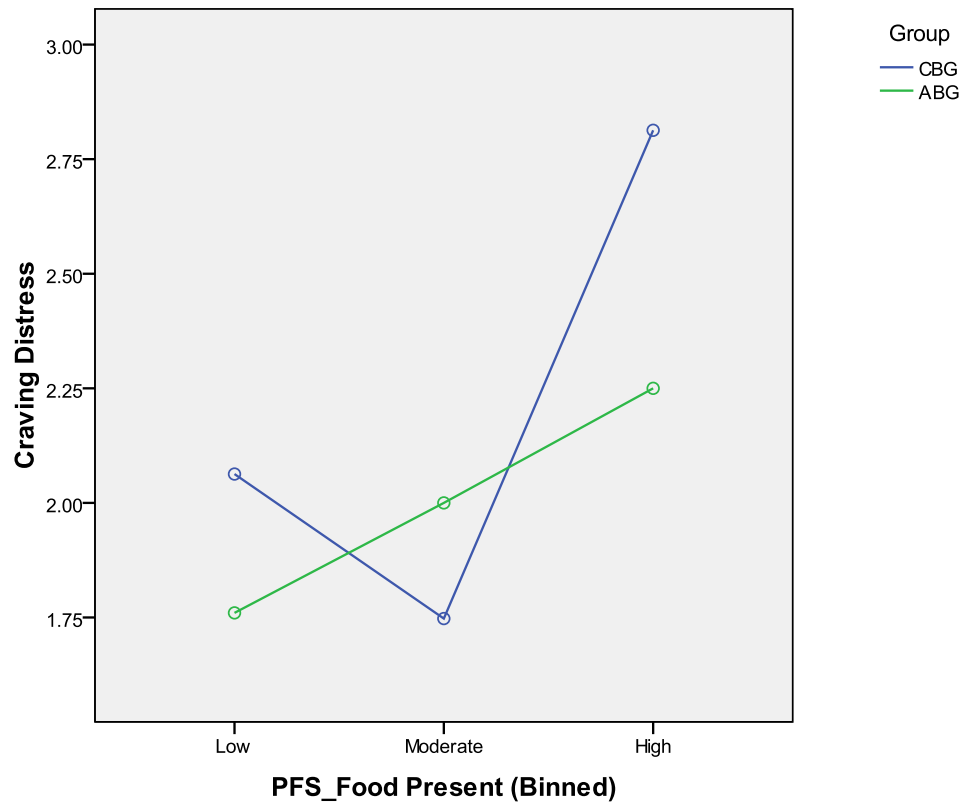
**Figure 6. Group by Power of Food Interaction Effect on Self-Reported Sweet Consumption**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2,41)} = .29$ ,  $p = .75$ ,  $\eta_p^2 = .01$ .



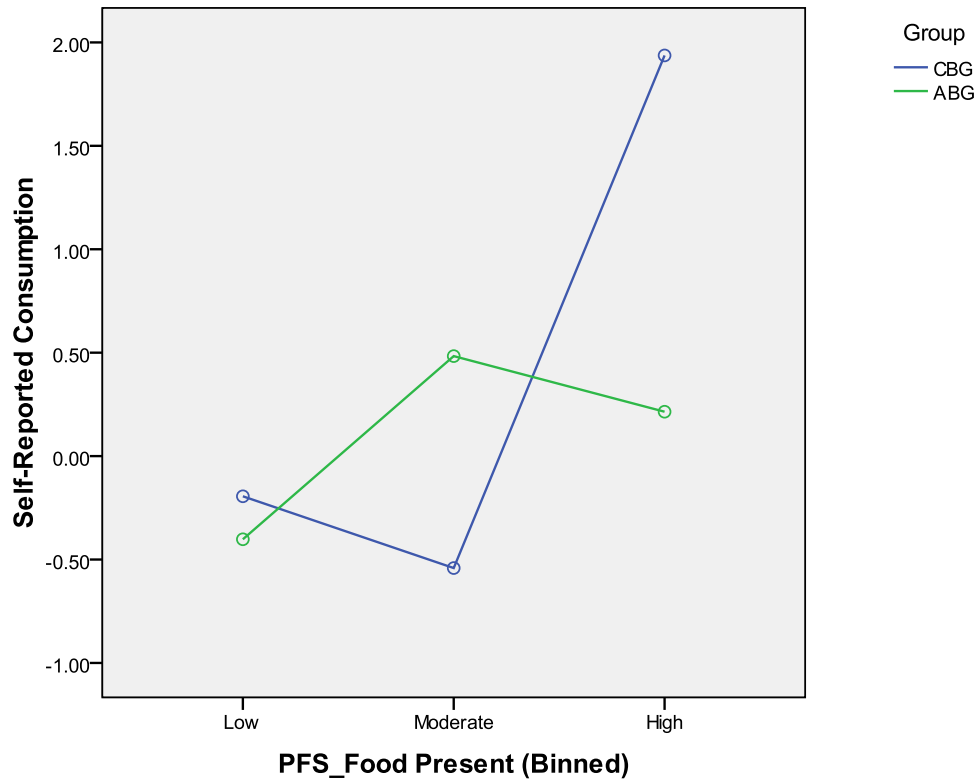
**Figure 7. Group by Power of Food-Food Present Factor Interaction Effect on Food Craving Questionnaire-State Version**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 41)} = 2.71$ ,  $p = .08$ ,  $\eta_p^2 = .12$ .



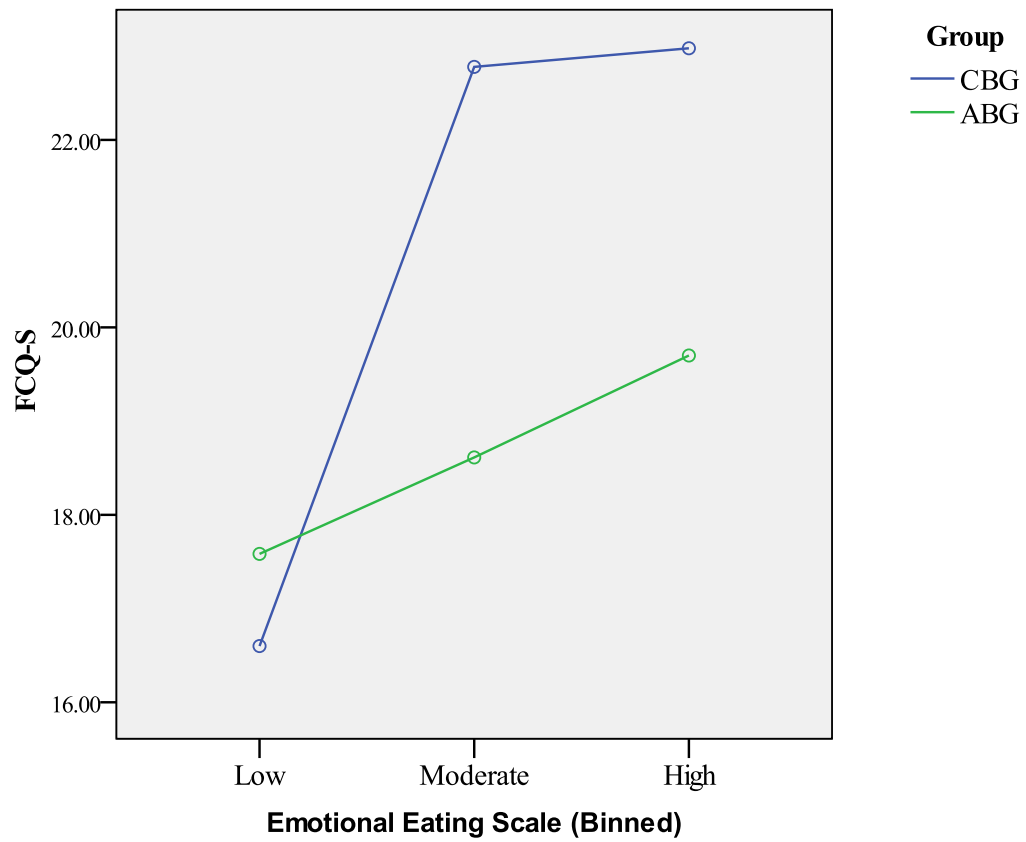
**Figure 8. Group by Power of Food-Food Present Factor Interaction Effect on Craving Distress**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 41)} = 1.79$ ,  $p = .18$ ,  $\eta_p^2 = .08$ .



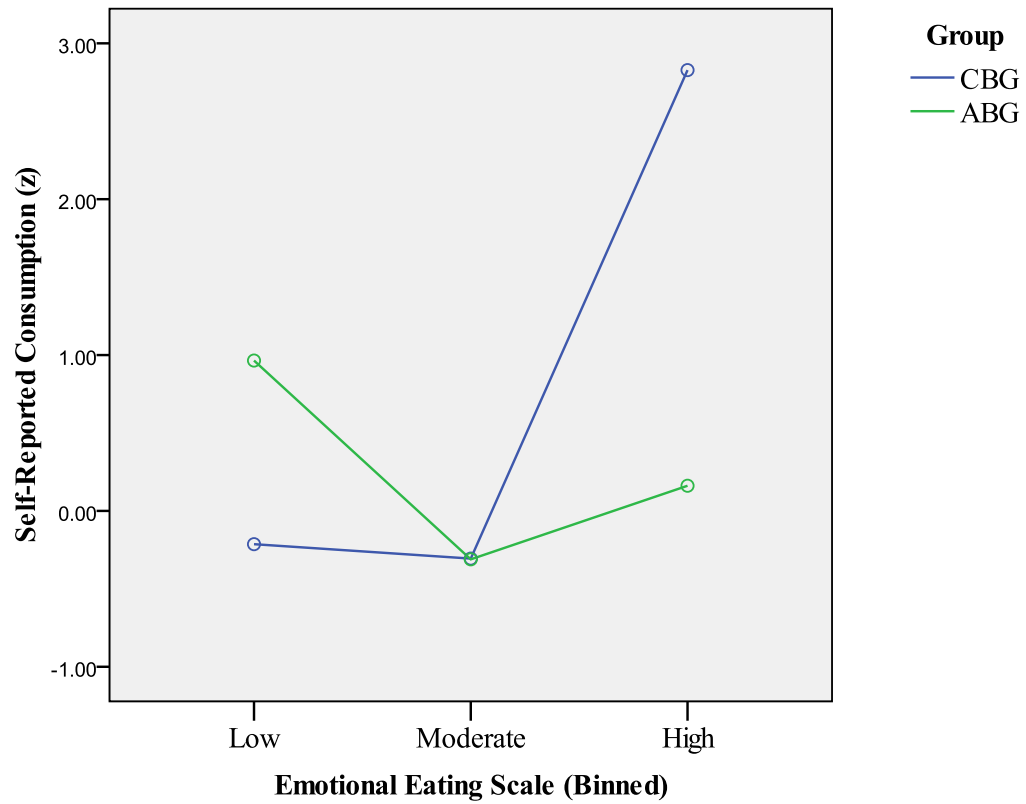
**Figure 9. Group by Power of Food-Food Present Factor Interaction Effect on Self-Reported Sweet Consumption**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 41)} = 1.36$ ,  $p = .27$ ,  $\eta_p^2 = .06$ .



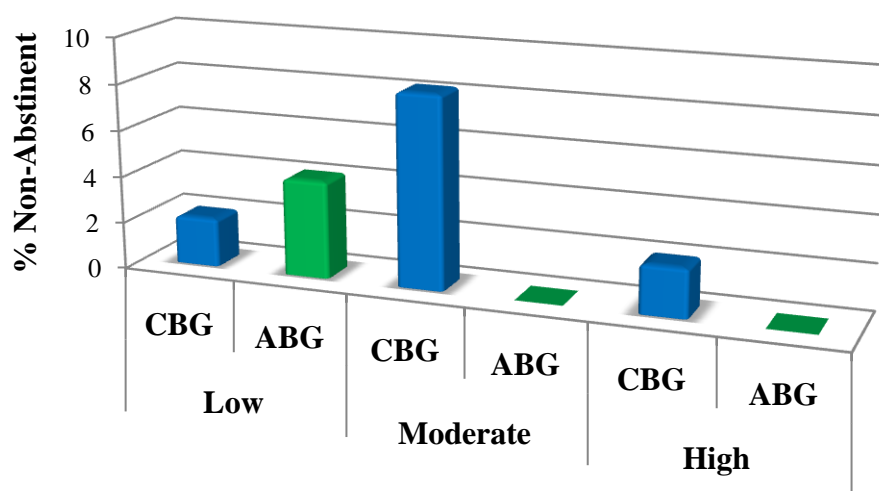
**Figure 10. Group by EI-Emotional Eating Scale Interaction Effect on Sweet Cravings**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 42)} = 1.20$ ,  $p = .31$ ,  $\eta_p^2 = .05$ .



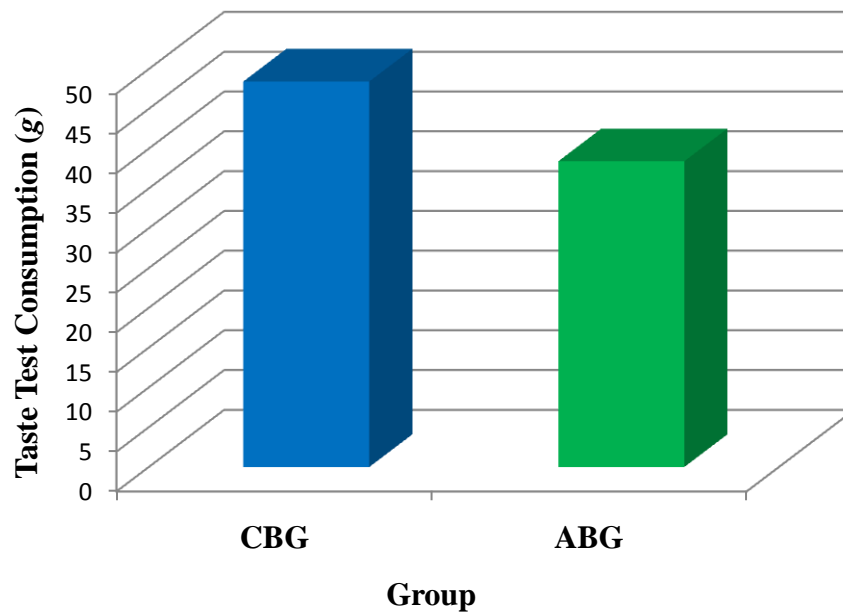
**Figure 11. Group by EI-Emotional Eating Scale Interaction Effect on Self-Reported Sweet Consumption**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $F_{(2, 42)} = 2.54$ ,  $p = .09$ ,  $\eta_p^2 = .11$ .



**Figure 12. Proportion of Sample Who Were Non-Abstinent from Candy Container by Group and EI - Emotional Eating Scale**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group; Odds Ratio = 18.26, B = 2.91, Wald = 1.30,  $p = .26$ .



**Figure 13. Group Difference in Taste Test Consumption**

*Note.* CBG = Cognitive-Based Group, ABG = Acceptance-Based Group;  $t_{(42)} = .78$ ,  $p = .44$ ,  $d = .24$ .



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